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SOME IDEAS ON BEING NEIGHBORLY IN GOOD AND BAD TIMES

Discussing the value of a pleasing voice in telephone conversations, a writer in a recent issue expressed the opinion that operators in small towns seem to find it easier to convey the thought of personal interest in talking to subscribers than do the big city operators.

And this is true despite the fact that metropolitan companies spend much money to train their operators to acquire and use "the voice with the smile."

On the other hand, probably the very difference mentioned is just why the large companies find it necessary to emphasize the business importance of the courteous, friendly voice at the switchboard.

* * * *

It is not difficult to explain the point noticed by the writer in question, who happens to be Miss Anne Barnes, traveling chief operator of the Iowa Independent Telephone Association, and who is an expert in training operators. The reason why small town operators find it more natural to be friendly and helpful than do their sisters in the big cities can be described in one word—*neighborliness.*

Nine times out of ten the average human treats his neighbor more cordially than a stranger; and from the very nature of things there is a closer, warmer neighborhood spirit in the small community than in the crowded city.

* * * *

It is not surprising that the city operator visualizes calling subscribers only as a mass of unidentified people, totally unknown to her, whose sole interest in "Central" is that she will give them the right number quickly. They are not her neighbors.

In the small town, the situation is entirely different. There are not so many people to know, and the operator is likely to be acquainted with both the calling and the called party. They are all neighbors and, usually, on friendly terms with one another, and desirous to be helpful.

That principle of telephone voice technique, which may be described as "friendliness," finds better development conditions in the smaller communities where there are more "neighbors."

Being neighborly is living up to the Golden Rule in a practical way, and, come to think of it, that is the effective form taken by the vast work which is now being carried on all over the country to relieve the unemployment distress. It is the right kind of cooperation among human beings—the more fortunate joining hands to help their needy neighbors.

* * * *

At this time of the Christmas season—when hearts are more kindly—this wave of neighborliness is going strong, and the extent of relief work being performed surpasses all records.

Viewing the outpouring of this national generosity, one cannot escape the thought that if this spirit of helpful cooperation continued indefinitely, there would never be any more distress or want. But, of course, human nature isn't built that way. Memories are short, and when the emergency has passed most of us forget our duty to our neighbors.

* * * *

This same thought is contained in a letter received from a telephone man who has been helping in a drive to collect funds for

GREETING!

Telephone workers next week will be busy transmitting holiday greetings all over the world. They do a big share of the work connected with the exchange of Christmas goodwill messages and wishes for the New Year.

To the telephone fraternity everywhere, "Telephony" extends its sincere wishes for a Merry Christmas and a Happy New Year, "and another thing"—as Amos 'n' Andy say—the equally sincere hope that we all look to the future with new confidence and courage, and prove ourselves more worthy of the blessings we enjoy.

the unemployed in a Mid-Western city of medium size..

"When the business depression brought trouble and distress to many people, the big corporations came to bat with large contributions to the relief funds," he writes. "I notice that Big Business led the subscription lists in the larger cities. When the crisis passes, probably, Big Business will resume its relentless program of gobbling up its small competitors, regardless of their desires or their right to continue in business.

"If the anti-trust laws impede its onward march, Big Business invents legal detours to get around them, or schemes to repeal the anti-monoply laws, or amend them to make them toothless. That is what Big Business does to its neighbors in normal times, although in hard times it gives generously to help the jobless.

It is curious that the natural law of the jungle works just the opposite. When one wolf goes down, the rest of the pack tears him to pieces. In American business, when misfortune comes, Big Business extends a helping hand. It is only when times are good and the country is prosperous that Big Business tries to squeeze its neighbors to death and establish a monopoly. Why is it?"

* * * *

The observations of our correspondent are rather interesting. As to his question, the answer comes to mind that maybe Big Business pursues that policy because it considers it more sportsmanlike—or more prudent. Things can be done in prosperous times that will not be tolerated when people see breadlines forming and are more sensitive about the welfare of their neighbors.

COMING CONVENTIONS

South Dakota Telephone Association, Cataract Hotel, Sioux Falls, January 13, 14 and 15, 1931.

Minnesota Telephone Association, Hotel Lowry, St. Paul, January 27, 28 and 29, 1931.

Nebraska Telephone Association, Lincoln, Hotel Lincoln, February 10, 11 and 12, 1931.

Texas Independent Telephone Association, Fort Worth, Texas Hotel, March 17, 18 and 19, 1931.

Iowa Independent Telephone Association, Hotel Fort Des Moines, Des Moines, April 7, 8 and 9, 1931.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 6 and 7, 1931.

Up-State Telephone Association of New York, Seneca Hotel, Rochester, May 20 and 21, 1931.

Pennsylvania State Telephone & Traffic Association, Hotel Penn Harris, Harrisburg, May 26, 27 and 28, 1931.

State Regulation Upheld.

Members of state utility commissions are much pleased with the U. S. Supreme Court opinion handed down in the Chicago telephone rate case. In fact, the deeper they analyze the principles laid down by Chief Justice Hughes—endorsed by a unanimous court—the more the state authorities believe that it will strengthen the system of state regulation, prevent federal encroachment and increase the state's power over holding companies.

State commissions say the keynote of the opinion is the establishment of the right of the states to be left undisturbed in their regulation of intrastate commerce so long as constitutional limitations are not infringed.

The U. S. Supreme Court's rule is designed to protect state authority, it appears, and it requires a judicial finding of facts which show confiscation before the dominant power of the federal government may be exercised to restrain governmental action of a state within its appropriate sphere. At the same time the opinion does not require similar findings to be made by a state commission acting legislatively in the fixing of service rates.

* * * *

John E. Benton, general solicitor of the National Association of Railroad & Utilities Commissioners, issued a statement in which he says the court's opinion "emphasizes the facts that intrastate business must pay its own way; that its rates must be fixed without regard to the profitableness of the interstate business; that it may not be burdened by any improper cost resulting from inter-company transactions, and that such transactions may be closely scrutinized."

"The right of state authorities to full information with relation to these inter-company transactions can no longer be questioned," says Mr. Benton in the statement. "The respective duties of regulators and utilities are thus made clear."

Possibilities in Telephone Sales

Description of Two Weeks' Sales Training Given the Average Telephone Salesman—Various Motives for Buying Discussed; Methods of Approaching Customers—Address Before Convention of Illinois Telephone Association

By John W. Wolcott,

General Sales Engineer, State Area, Illinois Bell Telephone Co.

Some of us who have been responsible to our management for sales may have had some unpleasant moments in the boss' office this year. If I have had any moments of that kind, they have, fortunately, not been because sales were bad. As a matter of fact, in our area—the state area—which includes all the Illinois Bell territory except Chicago, sales have been bigger and better than ever before.

Not only has the quantity been better than might have been expected because of the business recession, but a large number of high-priced equipment items have been sold. Among other things, some 70 dial P. B. X. systems are included. Because of our sales success this year, we are of the opinion that the methods which we are using are sound. We are also of the opinion that we have a long way to go before we will be doing as well as we ought. And when that time comes, we shall, of course, try to do better.

It seems a fundamental consideration in *selling* any kind of a product, not just taking orders for it, that the first step is to train the people who are to sell it. So with the training of salespeople—and this means every man and woman in the business office, certainly, repairmen and installers and the chief operator and her supervisory people—is the place to begin. So you and I will begin there.

In laying out a training course we gave consideration to what the crowd needed to know to do a good job and then, how to tell them about it. It is, of course, advantageous to have the salesmen know everything there is to know about the

equipment. He will seldom tell all these things to a customer—he never will unless he is forced to by circumstances.

The salesmen should also know how every item which he has for sale can be applied to serve certain communication needs. When he knows how the equipment works and which equipment item or items will do a particular job to fill his customer's needs, then it would seem that if the salesman also knows how to tell the customer about these things, sales will result.

That is our experience. The sales training needed to turn out a fairly well-informed salesman, if he is a telephone man to begin with, requires about two weeks, although training is a job which is never finished.

During the first week we cover dial P. B. X. systems, cord and cordless P. B.X. boards, wiring plans and miscellaneous equipment items. We have about a day and a half of "developmental" consideration of sales matters, and about two days of sales trials by the "case" method in which an effort is made to apply the things which have been brought to light during the "developmental" period.

In the second week, which has been given to men only, telephone typewriter and toll service are fully discussed. Selling telephone typewriters or any sort of toll service, is a job for a high-grade man. To do a good job in these fields means contact with executives who are high in the customer's ranks.

This is true because the adoption of an in-collect plan, under which the customer agrees to pay the charges on incoming toll calls, or the adoption of the key-town plan of selling, is no small matter for a business concern. It follows that someone high in the organization must be sold the idea, for the concern's method of doing business is to be changed.

Our sales training is given by a man with some 30 years' experience in plant, traffic and commercial work. In order to keep the class awake, he draws on his long experience in the business to talk to them for a few minutes, morning and afternoon, about matters relating to the business, but not to sales. The students regard these short talks highly; and we regard them as an important opportunity, which we embrace, to sell the crowd on the telephone business as a business.

In opening the training course, it is made clear to the students that there will be no tests or examinations of any sort. It is also said that the proceedings are secret and "If your boss asks me how you got along, I'll say, 'You did fine, just like all the rest of them.'" This puts the crowd at ease.

The last day we ask them to write a page of comments on "What would you change in this course if you were doing it?" but we have no tests. The comments help us to improve the course.

As soon as everyone is at ease, a discussion as to why we sell is started and these reasons usually are developed:

1. We sell to make money.
2. We sell to better serve our customers.
3. We sell to meet competition for dollars.
4. We sell to educate our customers.
5. We sell to fill up spare plant.

Then the members of the class are asked what they would like to know if they were going out to sell. And it develops that they would like to know all about our equipment, how it works, how it is used in its many applications, the rates, the reason for the service connection charge, all about the prospect and his business and his promises, what kind of service others in the same business have and why the prospect will buy. So there follows a discussion of an hour or so about "buying motives" or why people buy.

The class writes down the motives as they are developed and usually about 30 are uncovered. These range from "sense of duty," the reason some of us have for giving money to the church, to "keeping up with the Jones's," the reason some customer may have for buying a colored handset. These motives are then fitted in with the sale of telephone service and it is shown that every motive may be a reason why some one will buy.

For instance, after one of our men had taken the course, he sold service to a scoutmaster of the Boy Scouts. Previously the scoutmaster had always refused to take service saying: "If I had a telephone, my wife would be answering calls all the time I had the troop out. Parents would want to know when the boys would be home."

So our man said: "Your sense of duty to the parents of those boys tells you that you should have a telephone. That's true, isn't it?" And the scoutmaster said, "Yes, I guess it is," and the sale was closed.

A sale to a school teacher, who said she did not want her name listed because pupils would call her at night, was made on the same basis. She would agree to buy a party-line service, but we do not give unpublished number service on party lines. So an appeal was made to her sense of duty to her pupils and she took party-line service and has her name in the directory.

GUIDE POSTS.

I am not bound to win, but I am bound to be true; I am not bound to succeed in all I undertake, but I am bound to live up to what light I have. It is my duty to stand with anyone who stands right, stand with him as long as he is right, and part with him when he goes wrong.—Abraham Lincoln.

Buying motives are important. Listen to what the customer says, and he will frequently tell you what will make him buy. Here's an illustration of what I mean:

A woman applies for service. She says: "I have just been married and we want a telephone, like the one I had at home, for $2 a month."

Now this rate is recognized in this particular office as the four-party rate, and as we try to sell individual line service, we are quite likely to ask this young woman to take a better grade of service.

But she says: "Why, the service at home was always fine, and it is just what we want. You know it costs a lot of money to get started these days, and my husband has fitted up such a nice little house for me that I must be careful how I spend his money."

Obviously, it will do no good to give this woman a long talk about how much better individual line service is than party-line service. She has had party-line service and she says it's fine. But a smart inquiry like this by the salesman, "What sort of a radio have you, a Philco?" may bring the response, "No, we have a Stromberg-Carlson."

Then the salesman says, "I'll bet you're mighty proud of a fine radio like that, aren't you?" And the customer says, "You bet we are!"

The salesman now knows that the customer has a lot of pride in her new home; and he will sell an individual line with colored handsets in the living room and bedroom and a wall set in the kitchen, so that the bride and her husband will have as much pride in their telephone arrangements as they do in the rest of the nice things in their house.

This is real sales work, using the buying motive which the customer revealed to us—pride.

To make this point clear, let's suppose you go into a store and say: "I'd like to look at a suit of clothes."

The salesman brings out a blue suit, and you say: "I don't like blue." The salesman takes it away and brings out another blue suit. And you say, "I said I didn't like blue." So the salesman takes it away and this time he again brings out a blue suit.

I can guess what you would say now but I won't say it. The salesman in the clothing store, however, is showing as good sense as we do where we try to sell a customer on some buying motive which does not click with him. In real life you would have been shown a suit of some other color than blue after your first declaration of "I don't like blue." The salesman would try to find a color you liked.

Try to find the buying motive which your customer likes, and build your appeal on that line. Talk to the customer and listen to what he says, and you will not be showing him three blue suits.

I have just said that we sold this young woman three telephones; a telephone suit, if you please—coat, vest and trousers. You believe, and I believe, that coat, vest and trousers make a suit for a man—and they are bought and sold that way, by suits. You believe, and I believe, that a telephone suit has three pieces—living room, kitchen and bedroom. Sell them that way. Try to sell three, rather than one.

A customer who is offered one will seldom take three; but if you offer three, you have a much better chance of selling two.

And when we were selling this telephone suit with its individual line to Mrs. Newlywed, never once did we say any disparaging things about party-line service. We did talk about the advantages of the individual line which "Will never be busy unless you, yourself, are using it, Mrs. Newlywed! Just like your car! Won't that be great?"

Overcoming Customer's Objections.

If it is important to know why people buy, it is also interesting to know what they say when they don't. Quite often they say, "I can't afford it," or they may say, "I'll think it over," or "I'll talk it over with my husband." So we analyze these things to see what the customer means when he says them. After we know what they mean, the class develops things to say in answer to the objection which customers or prospects bring up.

I may say that we are making progress in respect to having all the objections, which our salesmen find it difficult to answer, sent in to the general staff where we can dissect them and furnish the answers to all our people. This is using field experience to its best advantage to strengthen the whole sales backbone—by keeping the best methods and the best technique of the field and staff available to all our people. Our objective in this matter is to have our best methods used by all our people all the time.

At the Palace Theatre tonight there is a movie, "Leathernecking." If you step into Block & Kuhl's, you can buy the book. Which would you rather do—see the show or read the book? We'd rather see the picture because we are accustomed to getting almost 90 per cent of our knowledge through our eyes. So the teacher talks to the class about word pictures and how to use them; and since he is a man who has always used them a lot, the class hears a lot of them during the week.

Word pictures are very important in our sales work. The pictures should be of the obvious things in the lives of our customers—homely things which click because they are real.

Here's an illustration of what I mean: "Miss Hoffman, there have been many times when you were seated at your sewing machine and your lap was full of the goods you were working on, and the telephone rang. So you stopped the machine, gathered up the material in your lap, stood up, spread the material on the machine table and ran downstairs to answer the call. That's true, isn't it, Miss Hoffman?

"And when you came back, you had to pick up your work, arrange yourself in your chair and arrange the goods in your lap, and get fixed all over again. That's so, isn't it, Miss Hoffman? It would be a great convenience to have your telephone right there where you wanted to use it, wouldn't it, Miss Hoffman?"

You have noted that Miss Hoffman has said, "Yes" three times to our questions, so that she's getting into the habit of saying "Yes." So we say, "You would like to have a telephone right there, wouldn't you, Miss Hoffman?" and she said, "Yes, I would." And you can be sure we'll install it right away. So we talk a lot about word pictures.

In the actual sales trials the leader usually acts as the customer. We distribute a typewritten problem to each one in the class so that each can read it, and then one is called on to make the sale. After the effort is concluded, the class criticizes what has been done. This is an example of a problem:

COUNTER CONTACT: A small automobile accessory shop with gas and oil pumps is being opened in a community center. The owner applies for the cheapest business service, because he is starting business with very little capital.

Where this contact is well handled, an individual line with an extension in a weatherproof housing and two or three extra listings are sold. Quite a long way ahead of the "cheapest business service."

Five Elements Make Up a Sale.

We give consideration to the elements which enter into a sale all the way through the course. We stick to five elements which, in general, make up a sale of service:

1. Preparation.
2. Approach.
3. Telling our story.
4. Closing.
5. Follow up.

Preparation starts with a clean shave and clean linen, and ends when we know all about our services and their uses, the customer and his business.

A business-like approach is taught. With business customers, the approach is through suggestions as to increased profits by further uses of our services. With residence customers, the measuring stick is comfort and convenience.

Telling our story, or the presentation, brings word pictures and pencil diagrams and sometimes items of equipment into play.

Closing—the part of the sale which gets the name on the dotted line—is a natural process which follows where a good presentation with proper usage ideas, customer advantages, and appeals to the emotions has been made. The presentation is the heart of selling telephone service.

The follow-up is especially important, especially with high grade items like dial systems, telephone typewriters, order tables and toll service which are seldom sold on one call. Following up our calls, getting around to see our customers, is very important. Perhaps the customer has a loose dollar. If we are calling on him, we have a fine chance to get it, always with the idea in mind that we want the dollar when and only if the customer will be better served because of spending it with us.

Up to this point I have been telling you some of the ideas we have on training. As I said before, training is fundamental and we all appreciate that. Even if I knew how, I could not, of course, give you a course of training in 15 minutes. I have only tried to give you an outline of the groundwork on which we built our course.

Completion of Sales Training.

Let's assume now that you've had your people together and told them about your company and its organization and its policies, and that they are sold on the company and on you and on themselves, and now they are ready to sell. Who will buy?

In general, business finds itself with three outlets for its product. It can sell:

(1) More goods to its present customers.

(2) To new customers in the present trade area.

(3) To new customers in new trade areas.

In the telephone business, because our trade areas are definitely limited, we have the first two outlets only. We can sell more service to our present customers, and we can sell to new customers. Of these two fields, there is no question as to which one should have intensive cultivation under such conditions as exist today. It is the market which exists with our present customers, particularly business customers.

In our company we started last March to interview 1/12th of our business customers each month. In each of our exchanges we are interviewing department stores, dry goods stores, shoe stores, and clothing stores during November. We work the same kinds of business in each exchange during the same month so that results may be comparable.

Our men visit our customers and make a straight service approach: "Mr. Pitcher, my name is Wolcott of the telephone company, and I've come in to see if there is any way in which we can make your telephone service of more profit to you."

In the hands of a salesman who believes in his service and what it will do, I may say perhaps, that if you have a fair assortment of equipment and convenience items to offer, one sale in ten calls will

CHRISTMAS JINGLES

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

Jingle bells, jingle bells,
Jingle all the day,
Oh, what fun it is for me
To jingle bells all day!

For Christmas day is coming soon,
It's one short week away,
So I'll jingle bells, jingle bells,
Jingle all the day.

Say!—
Jolly old Saint Nicholas,
Turn your ear this way,
Don't you tell a single soul
What I'm going to say—

Mother wants miniature golf,
So father'll get some holly;
Brother wants a pair of skates,
And he wants the best, by golly.

As for me, my little brain,
Though not very bright,
I'll just work my dear old dad
For everything in sight.

And from Jack, my dear old date,
I would like a ring;
Soon he's going to marry me,
So a diamond ring do bring.

Oh, I'll jingle bells, jingle bells,
Jingle all the day,
For Christmas day is coming soon,
It's one short week away!

Little Mary Muffet sat at her board,
Serving her customers all day;
There came a bad ache right inside her,
But it couldn't scare her away.

Mary, Mary, Telephone Mary,
Why is your service not slow?
"I jingle bells, jingle bells,
As fast as I can go!"

Poor little Mary sat at her board
Eating her Christmas pie;
She stuck in her thumb
And pulled out a plum,
And said, "What a good girl am I."

I have been wondering, tonight, how many operators will be sitting at their boards on Christmas day. There will be hundreds of them, of course, because the calls must go through every day, *and Christmas Day.*

Christmas Day would not be so joyous, carefree, and safe for humanity if there were no telephone service. But Mary dears, you faithful ones, serving on this one day of the year in particular, when you would love to be with your friends and dear ones, here is my Christmas thought for you——

The holly may fade, and the candle grow dim,
And the bright Christmas memories wane;
But the light and the cheer of unselfish service
Through all the long year will remain.

result—and some of the sales may be big ones.

From the standpoint of our relations with our customers, I believe that these planned interviews, or scheduled interviews, as we call them, would be worth what they cost even if we did not sell so much. And the beauty of it is that this job isn't costing us anything out of pocket. We added no salespeople. We merely gave a planned month to the people we had. The best of these people plan their days.

The results from planned work are much better than the results from unplanned work. One can build a house without a plan, but most of us would use one, because we know the result would be better.

During the contact with the customer at the time of the scheduled interview, the salesman attempts to completely service the customer in respect to his communication needs. The telephone equipment and arrangements are looked over to see that the equipment is in good shape. By that I mean, to see that its physical appearance is in harmony with its surroundings. By arrangement, I mean the layout in respect to the convenience of the users of our service.

People do things which are easy to do. A convenient arrangement promotes use of the service, and promoting use of telephone service is one of the most powerful agencies for the prevention of disconnects that I know of. People do not give up telephones which they use.

Adequate telephone service really exists in few businesses. Inadequacy is most frequently evident in the number of lines or trunks which the customer has. Salesmen work to be certain that the customer has adequate service. It is almost impossible to oversell, but where we do, we correct the condition ourselves as soon as it becomes evident.

I shall digress for just a moment to say a word about the value of auxiliary service on two or more lines as compared with the service value of the same number of non-auxiliary or non-consecutive lines. To begin with, a telephone plant is designed on the assumption that a certain number of calls will be delayed because all the cord circuits, say, are in use at the moment a call is started.

You are all familiar with a magneto switchboard, for example, with 100 drops but with only 12 cord pairs. Now all the drops might fall at once, but only 12 could be answered simultaneously. In other words, there is a probability of delaying a call once in a while because, if even the 13th drop falls while the 12 cords are in use, there is no cord with which to answer. The probability of delay which is used varies with the particular service and equipment involved and with the policy of the management.

Our salesmen tell customers in competitive businesses: "Only once in a hundred times when a customer calls you, should he get the 'busy' signal." This is sound. This is what I mean by "probability of delay." In this example the probability of delay is one in 100.

If a customer takes service on such a basis—that only one call in 100 will get the busy signal—he will be giving better tele-

phone service than many of his competitors; but at the same time he would not think of closing his door during business hours to one of each hundred of his customers.

I shall tell you a fact now about auxiliary service which may startle you. I omit the proof of these figures because the proof is high in the realm of mathematics; but if you are interested I can, by coin-flipping and dice-rolling examples, make it clear to you. The fact is this—*two auxiliary* lines will handle 15 times as many calls as one line and give the same grade of service—one delay in a hundred—in each case. This means that a customer with two auxiliary lines will give exactly as good service to people calling him as though he had 15 lines which were not auxiliary.

This fact is a matter of outstanding importance in sales work to improve the customer's service and to improve local completion. We have issued a memorandum on this matter and if you will write me for it, I shall be glad to send you a copy with the compliments of the Illinois Bell Telephone Co.

And now we'll go back to our scheduled interviews for a minute. The salesman has finished the local service items with the customer and, especially if a sale has been made, because the customer feels good if he has bought something, the salesman tackles the customer's residence layout. The salesman is there in the presence of the prospect, and that's where sales are made. So he tries for an individual line, if the customer has a party line—we call them four-family lines—and for extensions and handsets. And he gets them!

In every interview the salesman talks toll. Where the customer's business in either buying or selling extends beyond the limits of the city, we make quite a thorough toll talk, but we are learning to make better ones.

If at every interview we get in a few words about the low rates for out-of-town calls and explain what station-to-station and person-to-person mean and explain the discounted rate periods, we shall have made a kindergarten start in toll sales—but it will be a start. Business people don't know as much about toll as we think they do. Let's tell them!

So here's an idea you can put to work profitably. Plan interviews with all your business customers. See all of them at least once a year and many of them more often. Recognize the seasonal trends in some businesses, and get around before their peaks.

Sales are made by salesmen in the presence of prospects. Since you will be at the place sales are made, work to sell every item in the line which will make a profit for your customer. And don't forget his residence service! In your preparation for the interview, you will have found out all about it.

In the residence field we all recognize that there is a wide market for the sale of extensions, regrades, handsets, convenience plans and intercommunicating systems and circuits. To say that the market is wide is to understate the case.

In the cases of your larger and finer residences, I suggest that you review their service and that you plan an interview with the owner for the purpose of selling him a telephone service which will be in keeping with the rest of his establishment.

In order to get yourself in the proper frame of mind to do this job, you will find it worth while to check up on your service in your home. Be sure that you have relatively as good an arrangement as you are to suggest to your customer; then you'll believe in what you're telling him, and it will sound real to both of you. I drive a Cadillac, and the salesman who sold it to me didn't drive up to my house in a Ford, or in a Buick either. You know what he drove up in!

If you can find the time and the money to seriously approach your residence customers in respect to extensions, you may wish to try a series of perhaps five or six pieces of direct-by-mail material, followed by a sales effort by telephone.

In the telephone business today we are proceeding on the fundamental that the basic residence equipment is three telephones, located respectively in the living room, bedroom and kitchen. The first mailing piece may be devoted to service in general, covering all these locations.

The next three pieces will be devoted one to each of the locations; and the fifth one may properly be another general piece or devoted to special locations like the playroom, hall, basement or garage. Be sure that the mailing pieces consist largely of pictures of people using the telephone at the places you are talking about.

The pieces may be mailed once a week, say on Monday night. If you wish to mail two pieces a week, mail on Monday and Thursday nights. About two days after the last piece has been mailed, make your sales effort by telephone.

In sales which are made by salespeople, it is what the salesman says that gets the order. So it will be important in your sales work to teach your people to say the right thing. They must say something, so it might better be right. We use a standardized canvass which our girls are asked to learn. After it has been learned, they will use it because that is the easiest thing to do.

If you decide to try this activity—and I think you may expect to sell 6 or 8 per cent of your prospects depending on your prospects, your rates, your service connection charges, your mailing pieces and your technique—the talk you make should be built along these lines. Get the customer to agree:

1. That it would be nice to have a telephone in the living room.

2. That it would be nice to have a telephone in the kitchen.

3. That it would be nice to have telephones in both the living room and the kitchen.

But before you get him to agree with these things, be sure to point out the inconvenience of the present arrangement, and get his acknowledgment that it is inconvenient. Use word pictures describing just what goes on in the house where the telephone is concerned so that the customer will understand what you mean.

Week's Sales Congress Held by Company at Lincoln, Neb.

The Lincoln Telephone & Telegraph Co., Lincoln, Neb., recently completed a full week's sales congress held for the primary purpose of giving additional training to men in the commercial and business offices at various exchanges and to sales agents who desired to increase their efficiency. The commercial superintendent, W. E. Bell, after explaining the sales policies of the company and the need, under modern conditions, of active solicitation for business, together with the purpose of the conference, turned the meeting over to H. F. McCulla, his assistant.

The first efforts were directed to giving the men in attendance, which also included many from the commercial and sales department at headquarters, a picture of the service map by showing the organization of the company, how it functions in each department, and how the service area has been increased until now it is not only nation-wide but that by cables and radio all parts of the world are coming into the picture. They were told of the departmental organization, how the commercial department is staffed and what personal activities are covered.

The second day found Clyde Burge, commercial engineer, in charge of lesson No. 1, which had to do with the elements of good service. Service, he said, includes in the minds of the customers everything that the company does in providing convenient, adequate and satisfactory arrangements for the use of the facilities; necessary to know because it is what the salesmen are selling him.

The customer is not interested in departmental responsibilities or internal routines or difficulties, but he is interested in the results of efforts of the company and its staff to supply him with what he wants; and he judges it, in the final analysis by the convenience with which he can obtain service, the spirit in which it is furnished and the effectiveness with which it meets his needs.

The lesson also went into the types and quality of service expected from the business office as well, and the importance of personalized service, because it not only affects the general standard, but makes for a friendly public and helps to secure adequate rates. (*Please turn to page 27.*)

Multiple Program Service for Small City

Development of Multiple Programs—Experience in Large Cities Applicable to Smaller Cities—Selectors for Two-Program Service—Address Before Program Service Division of United States Independent Telephone Association

By O. C. Levy,
Development Engineer, Automatic Electric Inc.

The program service industry, having first established itself and proved its field of usefulness, found itself faced almost at once by the problem of meeting the different entertainment desires of its subscribers in a fashion both satisfactory and economical. The situation of the various program service companies was in this respect much the same as that of the radio broadcasting stations from which they derived a good part of this program, and yet with which they were really in competition for direct listeners.

Here the program service company was somewhat at a disadvantage. While the radio broadcasting station derived its revenue almost entirely from advertisers who could not gauge accurately the value of the station's services and whose success, in fact, depended largely upon the quality of the entertainment they sponsored, the program service company obtained its revenue directly from a multitude of subscribers who would continue to pay only for service directly satisfactory.

On the other hand, the program service company possessed an advantage permanently denied the radio station. The latter must, of necessity, choose one only of a number of simultaneously occurring interesting events to present to its listeners. The program service company could, by the use of proper equipment, present two or more events simultaneously and permit its subscribers to choose for themselves the one to which they would most prefer to listen.

The first step in this direction was naturally taken in the larger cities. The problems here were intensified, and it was obvious from the start that no single-channel program service, however diversified the programs presented over it, could hope to meet the deep-seated desire for freedom of choice of entertainment or to satisfy the variety of tastes bound to exist among a considerable group of subscribers scattered throughout a large city.

Steps were, therefore, taken at once to provide a two or three-program service that would justify an adequate rate structure and which would, by attracting a large enough group of subscribers, yield a profitable return upon the investment. The experience of the program service companies operating in the larger cities and offering a multiple program service, has amply proved the wisdom of their course.

The installation of central office selecting equipment, connected to the subscriber's premises by a single pair, has enabled the widest possible appeal to be made. That is to say, it is still possible to offer a single program service to the more discriminating at a scale of rates designed to cover both residential and business use. The different possible classes of subscribers can thus be provided for to the mutual benefit of both the user and the program service company.

Human nature being much the same everywhere, the program service company operating in the small city is faced with the same problems as the one in the large city. The rapid spread of all new mechanical devices and conveniences to all parts of the country has resulted in producing the same demands, though differing in degree, in cities both large and small.

Nevertheless, although the demands may be much the same, the economic conditions under which they must be filled are decidedly different in the two cases. Consequently, separate considerations are required, bearing in mind the economic limitation for the solution of the problems of the smaller city.

In considering the application of multiple program service to the smaller cities, the first question that arises is the number of programs it is necessary or advisable to provide. The use of two programs overcomes many of the objections to a single program service. It goes a long way toward overcoming objections to the use of the service based upon lack of choice. It enables two outstanding programs from the principal radio chains or other sources to be offered simultaneously. Also, each channel can be reserved for a particular type of service.

Music only, the classical compositions and the popular dance music broadcast alternately during all hours can be offered on one channel. The other channel can be used for a mixed service, over which talks, broadcasts of sporting events, and music can be alternated as the opportunity offers.

Thus, the program service subscriber who desires the service mainly to provide an entertaining musical background, not too distracting to the attention or to the ordinary affairs of the house, can get it without the annoyance of periodically resetting the selector. At the same time, the second program with its variety of talks by noted persons, political speeches, or other matter, is available to him at any time.

From the entertainment standpoint, then, the two-program service is seen to represent a satisfactory advance over single program service and one which will widen the appeal of the service considerably. From the economic standpoint, too, the two-program service will be seen to represent a happy medium between the unsatisfactory single-channel system and the large city five-program system.

In the large city system, an individual pair of wires is carried from each subscriber's premises to the program central office, where it terminates upon a five-channel program selector switch. This pair then serves to enable the subscriber to operate the selector and to carry the selected program. The selector employed for this stepping mechanism is retained, but the number wheels are replaced by an extended shaft carrying a set of five cams.

Each cam has a spring assembly mounted beneath it, and the cams are arranged to operate the springs in sequence as they are stepped around. One program at a time is connected through condensers to the line as the cams are stepped around. The meter coil serves both as an operating coil for the selector and as a line relay, since it operates directly over the subscriber's loop. The power requirements of this type of selector necessitates a 48-volt battery.

For the smaller city, a simple two-program selector has been made from a standard, mechanically-locking, ring-up and cut-off relay assembly. Switching

THE DAY'S WORK.

Today I am wondering what would happen to me by now if 50 years ago some fluent talker had converted me to the theory of the eight-hour day and convinced me that it was not fair to my fellow workers to put forth my best efforts in my work.

I am glad that the eight-hour day had not been invented when I was a young man. If my life had been made up of eight-hour days, I do not believe I could have accomplished a great deal. This country would not amount to as much as it does if the young men of 50 years ago had been afraid that they might earn more than they were paid.—Thomas A. Edison.

springs on the ring-up relay are arranged, when in the normal position, to connect one of the two available programs through condensers to the subscriber's line. What is normally the ring-up relay can then be operated over one side of the line when the subscriber grounds the line through a push button.

This first operation of the push button causes the ring-up relay to operate, lock up mechanically, and transfer the line to the second program. A second operation of the push button causes the cut-off relay to operate, thereby restoring the ring-up relay and returning the line to the first program.

In applying this type of selector to the smaller city requirements, it is necessary to take into account the type of program distribution commonly employed. With but a single program in use, the necessity for an individual pair from the program central office to the subscriber almost disappears. Consequently the cost of the outside plant is frequently kept to a minimum by running a single pair, generally open wire, carrying the program to a wire center for a certain district of the town. A number of subscribers, perhaps 50 or more, in that district are then served from the program pair.

In putting in a new two-program system, or in expanding an old single program system, two methods may be employed. Keeping in mind the economic necessity for holding the expensive outside plant construction to a minimum, either selectors can be installed at the wire center and a second program pair extended back to the central office, or the outside plant can be completely duplicated for the second program, with a selecting switch in the subscriber's home.

That the complete duplication of the outside plant structure carries with it a number of decided disadvantages is, I believe, apparent. It involves the wide distribution of the labor necessary, with consequent loss of efficiency. It involves the placing not only of open wires to the wire centers, but the swinging of new drops to each subscriber's premises.

Today, even the smaller communities are realizing the unsightliness of open-wire construction and the value to civic pride of keeping it as inconspicuous as possible. It involves the placing of protection on the drops and the running of new interior wire in the subscriber's premises, with consequent annoyance to the subscriber and possible increase in installation time due to not finding the subscriber at home.

Also, it is readily possible that trouble in one drop may affect all of the subscribers in the district. With all of the drops in multiple, trouble-shooting becomes not only difficult but expensive in time and labor.

Contrasted with this, the installation of selectors permits the practical concentration of labor at the wire center, although some rearrangement of the outside plant may be made necessary by the fact that all of the existing drops may not extend back to the wire center. Work on the subscriber's premises is reduced to putting in the selector operating push button.

There is no increase of the number of drops entering a house and, consequently, no increase in maintenance cost from this source. The effect upon the other lines of trouble on one is minimized by the introduction of the condensers at the selectors. The trouble is thus localized and trouble-shooting is greatly expedited by the testing facilities afforded by the wire center under this condition.

The selectors are mounted together with their associated condensers, five to the strip, upon a manual type relay strip. Each strip is wired complete to a small terminal block on the end, and is equipped with a cover which completely encloses the selectors, shielding them from magnetic interference as well as protecting them from mechanical injury and dust. The strips can be mounted on a small rack, placed in a suitable weatherproof housing, and the whole assembly mounted upon a pole at the wire center. Power for the operation of the selector can be supplied from the central office battery.

The sole question remaining, then, is the comparative cost of the selector system as against the all-wire system. Here again the answer is favorable to the use of selector equipment.

While it is necessary, of course, to study each lay-out individually, studies made to date indicate that when all factors are taken into account the selector system shows a decided economy. However, even where the cost of the two systems is equal, a consideration of such undoubted advantages as the elimination of duplicate drops, protection, and interior wiring, together with the simplification of trouble-shooting, will swing the balance in favor of selector equipment.

Prices in the Metal Markets.

New York, December 15: Copper—Unsettled; electrolytic spot and future, 10¼@11c. Tin—Easy; spot and nearby, $23.75; future, $23.95. Lead—Steady; spot New York, 5.10c; East St. Louis, 4.95c. Antimony, 7.00@7.10c. Quicksilver, $106.

Latest in Amplifiers and Loudspeakers

New Developments in Program Service Amplifiers and Loudspeakers—Origin of Amplifiers and Evolution with Radio Sets—Address Before Program Service Division of the United States Independent Telephone Association

By W. H. Hutter,

Chief Engineer, Radio Division, Webster Electric Co., Chicago

It is proper to talk first about the origin of the amplifier because then we can better understand the necessities which prove to be the real cause or reason for the amplifier.

Origin of Amplifiers.

Years ago there were probably many reasons or uses which called for some amplifying means at practially the same time. Primary among these was our own mechanical telephone repeater which was the first method employed by telephone companies for boosting or amplifying voice for what was then known as long distance transmission. This repeater consisted of a specially-made combination of carbon button transmitter and receiver so connected that there was a mechanical gain lever and fulcrum effect. With the introduction of DeForrest's grid into the vacuum tube, the mechanical type of repeater quickly disappeared.

Aside from the necessity of the amplifier for repeater work was the early application to radio. However, I believe amplifiers were first used in telephone repeater work. We most certainly all agree that the development of the telephone repeater was the most important step in our present transcontinental telephone system.

In the early days of repeaters or amplifiers the frequency spectrum, if I may call it that, was relatively unimportant as they were only used for the transmission of voice frequencies which lay between 300 and 2,300 cycles. With the advent of radio broadcast and the introduction of music, it was vitally important that improvements be made all along the line.

This required a higher grade of cable, heavier loading and an extension of the frequency range in amplifier design. Likewise tubes had to be designed to keep pace, as well as the tremendous amount of work necessary to develop and design test equipment and oscillators which had greater ranges, to say nothing of the balancing networks and a multitude of detail equipment.

Improvement of the amplifier alone necessitated that we increase its low range from 300 cycles down to 50 and on the high

end from 2,300 to 5,000. This was not done all at one time but has been a gradual evolution. While these things have been going on in the telephone field, many other companies have been improving the speakers, pickups and amplifiers associated with their radio sets.

First one branch of the art would lead in development and then another. Step by step we have advanced, always seeking that the reproduction of music and voice be as nearly like the original as possible. We used to speak of this as straight-line amplification. This, however, I wish to call to your attention, is not the desired state of perfection.

It seems that amplifier development has had to make up the shortcomings of the two ends of our system; not because it happened to be placed in the middle, but because its design permitted of greater elasticity.

You remember the old type of speaker, which consisted of one ear telephone screwed on to a horn. Then came the cone speaker, pioneered by the Western Electric Co. Closely associated with the cone era we had the exponential horn.

Those were the days of bigger and better horns. Your neighbor invited you over to hear his radio on the new horn he had just moved in. Upon entering the door of his home you expected to find yourself in his living room; instead you walked into the gaping mouth of a six-foot exponential horn with some 20 feet probably coiled about itself, ready to leap upon you like a boa constrictor.

In those days, the all-important question the manufacturer of a radio set had to decide was how large a house, rather than a cabinet, had to be to contain a horn, the length of which determined the lowest frequencies the system would reproduce.

Thus it was that Tuned Impedance was introduced to Miss Amplifier.

In order to cut down the size of exponential horns, it was found that by overaccentuating the low response in an amplifier, or the bringing up of these low frequencies, it was possible to use smaller horns and cabinets and let the harmonics do the work of the fundamentals. About this time, the dynamic speaker was commercially born and somewhat caught up in the race for the flat response with its rival, the amplifier.

I well remember the first large dynamic speaker I ever heard. A telephone friend of mine, who was in constant touch with radio developments and a confirmed addict to set building, gloatingly led me by the hand into a dealer's store, which he helped support, where was proudly exhibited the first R. C. A. dynamic speaker set made. The store was packed with a noonday crowd of radio fans and set builders who, with exclamations of "Ahs" and "Ohs," held their hands to their stomachs every time a low note was emitted by the dynamic speaker. It was considered quite a marvel that you could feel the music as well as hear it.

While we had been tuning the low end of our amplifier to make up for deficiencies in the loudspeaker's range, it was also necessary to control the high frequency end of the spectrum to compensate to a degree for the cutting of side bands caused by too selective a radio frequency end. Thus it is that our amplifier has contributed more than speakers, pickups, or microphones in the search for ultimate perfection.

In the early days of design we were considerably handicapped by the lack of proper tubes. We had only the well-known 201 type and no power tubes. Power tubes were not so necessary in those days because no speaker existed which would take an output greater than that of a 201.

With the development of the magnetic cone, and more especially the dynamic speaker, it became imperative that we have a power tube. First among these was the 171 type with its output of 700 milliwatts. This relieved the situation after a fashion for a time, but with the design of bigger and better speakers it became important that another tube be introduced.

We then had the 210 tube with maximum output of 1,540 milliwatts. The 210 tube was a very successful tube from a tube standpoint, being of liberal tolerances and one which held up well and gave many hours of service. It did, however, have many drawbacks in the design of the associated equipment, insofar as it required a plate voltage of 425 volts and necessitated a high voltage winding, making the power transformer expensive as well as throwing a strain on filter condensers and audio transformers. This fact somewhat confined the set designer and manufacturer to the 171 tube, which was a difficult tube to produce.

With the trend of times the evolution of the radio set has been fundamentally the survival of the fittest. Each year we see fewer and fewer small manufacturers and more large ones. This means mass production, with the resultant slashing of costs in every way possible. We then come to the material need for a more adaptable and cheaper power tube.

Thus we have the 245 type with its power output of 1,600 milliwatts; more wattage output than the 210 with only half the plate voltage. The 245 tube is probably the most successful power tube ever designed for radio amplifiers. It fulfills all of the requirements admirably. It has a low plate voltage considering its power output, will take a tremendous grid swing, has a very low plate impedance, and in every way lends itself to economical construction of the associated apparatus.

The amplifier, as we find it today, has many applications, uses and possibilities. Let us take for an example one which is closest to us—the amplifier used in the subscriber's home of a program service set. Here again we see the amplifier full of possibilities, ready to take up the job of matching line impedance as well as speaker shortcomings.

First of all, program service more or less offers competition to the radio dealer, and it is possible in a very short time for the program service company to build up an enormous investment in subscriber amplifiers. One of the primary considerations in this type of amplifier should be quality of music to the subscriber at the lowest possible amplifier cost; the subscriber's rate to be such that it allows the company operating revenue, depreciation, obsolescence, as well as profit, but at the same time offers the subscriber quality of reproduction and program selection possible with any radio set in the price class of, say, a year's service of program service.

The purchaser of a radio set today has, of course, many things to consider. First of these, ability of the company which has manufactured it to stay in business or rather likelihood of this company staying in business. Second, obsolescence, for it is true that the radio field is a very fast-changing one. Third, and not the least important, upkeep.

Now let us see what part the program service amplifier plays in this setting. First of all, as I said before, its quality should be on a par with the best of the present-day radios. It should be so designed as to make up for line losses and speaker deficiencies. Considerable thought should be given to possible future changes necessary to prevent obsolescence, for it is not possible for a program service company to junk thousands of amplifiers every time a little development comes along. It may be necessary for them to bring the amplifiers in from time to time and make changes as the art improves, and the possibility of doing this should be given vital considerattion.

The physical shape and mechanical de-

Building Self-Confidence.

Self-confidence does not come suddenly as a result of repeating to oneself "I am confident; I am a new person; I am confident everywhere." The suggestive incantation of these phrases may assist somewhat in cultivating a favorable frame of mind, but they alone will yield only an illusory self-confidence.

Confidence is built up on the basis of our daily experiences. It is built up slowly. It is quickly destroyed. Having had self-confidence all one's life is no assurance it will continue.

If we have some daily tasks which give us an opportunity to do some of the things which our self-analysis shows us we can do best, our self-confidence will be either built up, or better retained. —Donald A. Laird, Director, Colgate University Psychological Laboratory.

sign of the amplifier should be such that when it is necessary to do any work on it in the subscriber's home, it is not necessary to use soldering irons to remove it from the cabinet or to replace a new one. Only a screwdriver should be required.

Its cost should be kept to a minimum by careful selection of circuits and parts, with due consideration to maintaining the high standard of quality, in order to keep the total subscriber's equipment at a minimum cost. Here good judgment must be exercised that this is not indulged in to the extent of costing the company money in maintenance.

The present trend of amplifier design from a physical standpoint is one of size. With the introduction of midget sets and sound on film, small portable 16 mm. equipment is finding great favor in the industrial field. This means portable outfits and therefore light and small amplifiers. Here again cost is a primary factor.

As an illustration, I will mention a circuit of recent design direct coupling. This type of amplifier employs no input transformer and no intermediate transformer. Due to the nature of its design, it is not possible to satisfactorily use a pushpull power output stage. Therefore, in order to secure the same output from this amplifier with a single tube that could be secured or that is comparable with a pushpull stage of 245's, it is necessary to use a single 250 tube.

Let us now consider the two amplifiers from a cost standpoint. While the direct-coupled amplifier requires no input or intermediate transformer and somewhat less capacity, it does, however, require a much higher voltage power transformer because of the circuit peculiarities as well as because a 250 tube requires a higher voltage than a 245. This also necessitates a good grade condenser.

Summing up these two amplifiers, let us say for the sake of rough comparison that the cost of a two-stage, direct-coupled amplifier using one 224, one 250 and one 281 without tubes would be $19.00. The cost of a two-stage cascade-coupled amplifier using one 227, two 245 and one 280 without tubes would be $23.00. This on first glance appears to be quite a saving in favor of the 250 job.

Let us now add to it the cost of tubes in each case: One 250 at $11.00, one 281 at $7.25 and one 224 at $3.30 will amount to $21.55. Add this to the price of your amplifier at $19 and you have $40.55 for a two-stage, direct-coupled amplifier wtih tubes.

Let us now take the two-stage, cascade-coupled amplifier. You have one 227 at $2.20, two 245's at $4, one 280 at $1.90, giving a total of $8.10. Add this to the cost of the amplifier at $23, and you have a total cost of $31.10.

This is what I mean by a careful consideration of all apparatus concerned. From a service standpoint it has long been known that a 250 tube is difficult to manufacture and does not stand up well, while the 245's are almost universally used and give excellent service and long life.

With the introduction of mantel radios this year, the pocketbooks of the vast middle class have been reached, making it possible for those who have never owned a radio to acquire one. This it seems to me places before program service company considerable food for thought at this time.

I have compared the cost of two audio systems plus their tubes, which systems are comparable to the present-day fairly expensive radio. Let us now see which is the very cheapest possible amplifier that can be made consistent with quality and low maintenance cost and comparable to the mantel set, which would give ample volume for 90 per cent of the homes:

Using the present "Pup" type of speaker, an amplifier of the direct-coupled type, using no input or intermediate transformer and a very small output transformer using one 224, one 245 and one 280, could be made to sell for $13.00 in quantities. The tube cost of an amplifier such as this, allowing manufacturer's discount of only 40 per cent, would be $4.30, bringing the total cost of the amplifier plus tubes to approximately $17.30.

This amplifier would also furnish direct current for the field of the dynamic speaker, which speaker should cost in the neighborhood of $2.00. There are very good cabinets of the mantel set type, and even larger, that can be purchased for $3.00, which would give a total cost of $22.30. This gives an idea of cost range comparable to present-day receivers of all classes.

A turntable and pickup could be added to this for an approximate cost of $8.00, which brings a combination set up to a total of $30.30.

You may be interested to know of some of the applications of amplifiers today. Rapidly coming to the front, we have public address systems. This introduces amplifiers of all sizes and descriptions, from 4½ watts up to mammoth hotel installations, such as the new Waldorf-Astoria in New York for centralized radio service which would require in the neighborhood of 500 watts. This would mean approximately 100 of the 250 type tubes.

The installation of the public address systems into grade and high schools is becoming universally accepted and as necessary as the plumbing. These installations run from 15 watts to 50 watts. Playgrounds, hospitals, summer resorts and the like are other places of installations.

I recall a recent installation on the yacht of a General Motors executive which cost $15,000. This embodies automatic phonograph, radio and microphone. It is controlled from any part of the ship in the same way that you would dial a telephone number. Thus *P* for phonograph, 1 to 20 for your selection of 1 to 20 records; *R* for radio, 1 to 20 for your selection of any one of 20 stations; and *M* for microphone to connect your microphone to any one or all of 20 speakers on the ship.

Theater installations are being constantly changed and improved. Television offers a lucrative field for the design and application of amplifiers, all sorts of sound equipment, small home units and portable units for industrial purposes.

Amplifiers used in connection with photo-electric cells are now in general use in silk mills for determining color and quality, in the manufacture of cigars for testing and eliminating cigars which are off color and shape. Burglar detection, safety devices, control devices such as at airports where the sound of a plane's propeller actuates a relay through a tuned circuit at that frequency through amplifiers, or whereby relays are operated by the plane's floodlights on a photo-electric cell, and hundreds of other uses.

The evolution of the pickup has been towards securing an over-all frequency response and, having accomplished this, towards increasing the output to such a point that sufficient gain may be secured from a pickup and input transformer to operate two 245 tubes in pushpull. With the coming of the pentode tube, this may be possible with some high gain pickups at present.

Successful Year for Oklahoma District Telephone Meetings.

The last of the 1930 district meetings of the telephone division of the Oklahoma Utilities Association, were held at Yale, November 17, Purcell, November 19, and Temple, November 21, with a total attendance of 235. During the present year 12 district meetings of the division have been held.

The Yale meeting was attended by 86 telephone people and citizens of Yale. The business sessions and noonday luncheon were held in the American Legion Hall and local arrangements were made by J. Ivan Pruett, district manager, Oklahoma Associated Telephone Co.

Attendance at the Purcell district meeting was cut down by a heavy rainstorm and a tornado at Bethany, which made it necessary for some of the telephone delegates to leave before the meeting was called to order. However, 46 telephone people and citizens attended the meeting and noonday luncheon.

The temple meeting, with attendance of 103, was held under the auspices of the Southwest Telephone Co. and the Temple Chamber of Commerce.

Among the subjects presented and discussed at the three meetings were: Rural line telephone service, accounting, construction methods, local and long distance service, public relations, commercial and traffic practices, maintenance of plant, telephone service from the public viewpoint, and association activities.

Municipal Plant Now Privately-Owned

Telephone Plant Owned and Operated Since 1908 by City of Martinsville, Va., Purchased by Lee Telephone Co.—Considerable Improvements Made Since Property Transfer—Special Training Given Operators to Speed Up Service

By B. L. Fisher,
President, Lee Telephone Co., Rocky Mount, Va.

It has been said that there are now three municipally-owned telephone plants in the U. S. A. Whether this is correct or not, we do not know, but we do know that there is now one less than there were prior to September 30, 1930. The one referred to was owned by the city of Martinsville, Va., since 1908 and purchased by us as of September 1, 1930.

This plant was originally built about 1900 by some 35 of the citizens purchasing their own telephones, a switchboard and some wire and starting an exchange much after the order of the farmers' mutual plants of today. Things did not go so very well, for the telephones had to be repaired.

A jeweler, D. L. Bowles, was the only man in Martinsville at the time who was able to make any repairs at all. It was not long before the owners, one by one, began saying to him: "You may have my interest if you will keep up my telephone and give me service at so much per month." This continued until practically all of the individual interests had been transferred to Mr. Bowles, and he began putting in telephones on the rental basis.

Mr. Bowles was accidentally killed in 1907 and the plant was operated by his widow until 1908, when it was sold to the town of Martinsville. At that time there were about 190 telephones of the Sumpter magneto type, connected to a Sumpter board. The consideration was $6,600. The writer at that time had made an offer of $5,000 for the plant.

The town of Martinsville continued to grow, as did also the telephone plant. In 1922 the old magneto plant was converted into a common battery plant and a new Kellogg full-feature cordless-type switchboard put in. During the last eight years the little town made rapid growth, becoming a city of 8,000 people with 800 telephones.

In 1905 the Bell company built a line from Danville, Va., to Martinsville and put in two or three pay stations. In 1908 these pay stations were discontinued and the line connected into the board of the municipal telephone plant.

For the last several years the Lee Telephone Co. has been building all around Martinsville, even to the extent of connecting some rural lines into the municipal board and having the switching done for us.

Our exchanges almost entirely surround Martinsville and are connected to it over the very best copper toll circuits. We also connect Martinsville by way of Winston-Salem, N. C., into the territory of the Southern Bell company and, by way of Roanoke, into the territory of the Chesapeake & Potomac Telephone Co. When the Martinsville exchange was taken over by us, there were 12 toll lines on the board,

B. L. Fisher Interestingly Tells of the Transfer of One of Few Municipally-Owned Telephone Plants in Country to Private Ownership and Reasons for Action.

all of them belonging to the Lee Telephone Co. except two which were owned by Bell company.

The service given in Martinsville was probably as good as would be expected from any municipally-owned system, yet it was far from being perfect. Because of the location of our properties, the writer often passed through Martinsville and, therefore, became personally acquainted with the business men who often asked why he did not take over the plant and give them service such as we were giving in our exchanges.

Telephone men know that practically all plants that could be purchased have changed hands during the last several years. Due to the relationship of our plant to the Martinsville municipal exchange, it was easy to see that if this plant was sold, it should come to us. Yet the city fathers would not consent to sell until the early part of 1930, when negotiations were begun in earnest for the transfer of the plant.

When this became publicly known, other interests tried hard to purchase not only the telephone plant but the electric light and water plant as well, which is also city owned. Yet we purchased the telephone plant at the original price offered, which was $100,000, the city refusing to sell either of the other two plants.

When we began operating on September 1, we found that no joints on the lines had ever been soldered. Many of these joints were so bad that the line under test showed open. We immediately set a gang to work cleaning and soldering these joints.

The operators had received no training. We secured one of the best chief operators in Virginia, and gave the girls intensive training for 60 days, which enabled them to not only to handle the calls quickly but courteously.

After this was done we sent out a questionnaire and received a large number of replies, by far the large majority stating that the service was much improved.

We are now terminating a number of new toll circuits in Martinsville, which became a toll operating center December 1, 1930. The plant is still housed in the municipal building and will remain there until such time as we have constructed complete new quarters. It is our intention during 1931 to put up a modern telephone building, which will include business office, storerooms, etc.

The purchase of the Martinsville plant gives us all of the telephone property between Winston-Salem on the south, Roanoke on the north and Danville on the east, extending west to the Blue Ridge Mountains. We own all of the toll lines, which are built according to the best standards of today.

Telephone Connection for Vessels in Port of Rotterdam, Holland.

The city of Rotterdam, Netherlands, has included in its budget for 1930 an item of $25,326 to provide seven dolphins (mooring posts) in the port of Rotterdam with double-stop contacts, thus enabling one or two vessels moored to one of these dolphins to obtain direct connections with the Rotterdam telephone service.

The vessel pays a single fee of $10 while so connected. Ship owners of vessels moored to dolphins in midstream are expected to make full use of this innovation. Application for connection must be made with the harbor master.

GREETING

STROWGER AUTOMATIC
DIAL SYSTEMS

GENERAL EXPORT DISTRIBUTORS
The Automatic Electric Company, Ltd., Chi

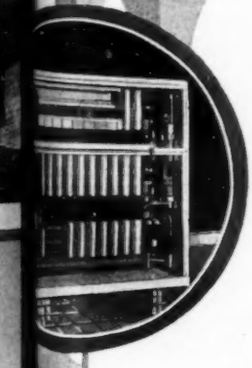
In Canada . . . Independent Sales and Engineering Vancouver
In Australasia . . . Automatic Telephones, L
In Japan . . . Automatic Telephones Ltd. of Jap

When writing to Automatic Electric Inc., please mention TELEPHONY.

From the Pioneer Manufacturer of Dial Telephone Equipment

IN glancing back over forty years of constant progress, the Strowger Staff, originators of dial telephone equipment and foremost protagonists of the Strowger System, finds ample justification for pride of accomplishment. During that time, the Strowger principle, once a doubtful fancy in the mind of an obscure inventor, has progressed to a position of world-wide acceptance and standardization. While this company takes a natural pride in the part it has played in this development, yet it feels that the greater credit should fall to the original qualities inherent in Strowger design, which, throughout the history of their practical application, have invariably resulted in raising the standard of telephone service.

This organization faces the future with the greatest confidence. At no previous time has the public been so ready to welcome and to favor with its support and goodwill, measures designed to provide it with a superior service. Never has capital been so willing to enter into an alliance with technical knowledge and executive ability to further the cause of better world-wide communication. And never before have telephone companies and administrations been more eager to seize and to apply the newest, proved means that engineering science has available for improving the commodity they have to offer.



Automatic Electric Inc.

Manufacturers of

GER AUTOMATIC DIAL TELEPHONE AND SIGNALING SYSTEMS

ry and General Offices: 1033 West Van Buren Street, Chicago, U. S. A.

Sales and Service Offices in All Principal Cities

ASSOCIATED COMPANIES

American Electric Company, Inc. . . . . Chicago
International Automatic Telephone Co., Ltd., London
Automatic Telephone Manufacturing Co., Ltd., Liverpool
The New Antwerp Telephone and Electrical Works . . . . . Antwerp

Comparing Radio and Program Service

Program Service Brings Into Homes Local Events as Well as Those of National Interest—Advertising and Sales Methods—Address Before Program Service Division of United States Independent Telephone Asssociation

By George B. Quatman,
Vice-President, The Utilities Service Co., Lima, Ohio

The real value of program service I think comes from its economic value, and the thing that must be borne in mind is the rendition of program service and its economic features.

In radio receiving sets we are required to have quite a duplication of equipment, in that we have in everybody's home a radio set with tubes, transformers and all the apparatus required for rectifying the many things we receive through the air; and that must be duplicated in every home in order to receive programs.

In program service we cut out the economic waste of that tremendous amount of equipment. We concentrate that equipment into one good piece of apparatus and thereafter distribute the program by wire into everybody's home. That is the greatest comparison. In a measure that is about as far, as I see it, that there is a comparison between program service and radio.

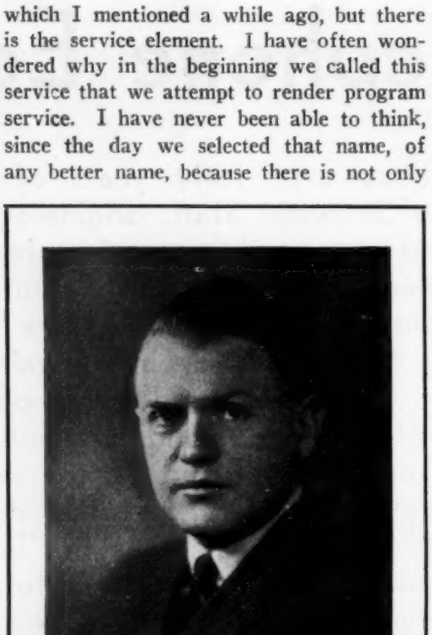
Program service goes just a step farther than radio. Radio service brings into your home the latest athletic events and furnishes entertainment of a national scope in which we are all interested. But program service must go a step beyond that and bring into your home those things which are of a local interest.

It not only brings into your home those things in which we have an interest nationally and those things in which we have an interest in our state, but also those in which there is a local community interest.

In all the cities in which we are operating program service, we are very keen at all times to bring into the homes of all our patrons the athletic events locally. Take twilight baseball; in the city of Lima, where the contest became very keen and the public had a very great interest, we brought into the homes of our patrons those games, play-by-play. It was a supplementary service to our radio service.

Every night at five o'clock our newspapers pick up the microphone and give the latest news of the day of a local interest. Accidents that occurred throughout the day and different things that happen are also broadcast. Our high-school entertainments, church rallies, conventions and things of that kind, in which the people have a local interest, are all profitably broadcast to our people locally.

There is a service secured from the program service company which is beyond the service that you get from a radio set. There are not only the economic features which I mentioned a while ago, but there is the service element. I have often wondered why in the beginning we called this service that we attempt to render program service. I have never been able to think, since the day we selected that name, of any better name, because there is not only the program brought into the home but there is a service supplied to the patrons that is not supplied in radio service.



Program Service, Declares Mr. Quatman, Must be Beyond Radio Service and Bring Into Homes Those Things That are of Local Interest as Well as Those of a National and State Interest.

In the tuning-in of a radio set a concert is brought into the home, and then about the time you sit down in your chair: "This is station so and so signing off." You get up out of your chair, tune in another station and get a concert which you think you or your guests might enjoy. Then you sit down to your enjoyment and a few minutes later you find that the orchestra, or whatever you are interested in, has concluded its program and the next thing will be a travelogue. You are no longer interested, and you have to get up again and retune the set.

When a program is definitely brought down into the home, that is a program service in addition to the program. The company rendering the service soon finds out at the end of a very short period what the thought of the public is, and what they really desire and like all the time. They let you know, and then you have that type of program constantly before you. So that service is supplied through the program service which is not supplied through the radio set.

You have music, and when one of those stations has completed its program, another starts on. People are very keen to keep dinner music on, and program service has a constant service for that. It does not fade out, because there is a paid employe who sits at the station and takes care of that fading, the distortion of the stations or any other type of interference, and that sort of supply meets a real need.

About 18 months ago we made a survey of the total number of people who had radios and also had telephones, and those who had radios and also had program service, and made a comparison of them. We found in that particular state that 40 per cent of the program service patrons were also the owners of radio sets—and they had the program service on top of their radio set or connected therewith as a supplemental service.

There was a service that they were buying in addition to the program, because they had the program as part of their own radio set—and still they were perfectly willing to pay this charge for additional service.

So there is a comparison between radio and program service in that economic feature which, by concentrating the radio equipment in one centralized location and by means of the idle telephone facilities, distributes a program into the homes at a cost below that at which a subscriber could purchase it if he had to buy his own equipment.

When all of the factors of the radio equipment are taken into account—the original cost, the depreciation, obsolescence and the current cost of operation—he can purchase the program service much cheaper than he can operate his own radio set. So there is the economic value and then the service value—the fact that he is getting a local in addition to his national service.

Advertising and sales methods form the problem in program service today. Many years ago, when some of us—the pioneers—started in program service, when we would announce that program service was to be supplied, people flocked to our offices by scores to make applications for it. That does not happen so much today. The newness of it and the amazement of

the whole thing made everybody keen to have one first.

Today everybody is not so keen to have a radio set in their home, because it is not anything new to show to somebody else. Business does not flock into the door as it formerly did. We became very much awakened to that fact about two years ago when we found that our program service subscribers were dropping off. We did not worry much about it, because we thought fall would bring them back. But it was not like the birds that came back from the South; when winter came the subscribers did not come back.

At that time we began to tell the public that the thing we had was not some mysterious thing that they should put in their homes to show somebody else, but that it really had something of value for them. That is when we began to create a sales organization to sell the program service.

We had to go from house to house and call on the people, taking a little demonstrating radio service set with us. We would try to get a sale through by getting into the house and showing our radio service set. Then we would call up our office and ask them to connect the telephone line so as to get a little music over the telephone.

We found that the advertising had to be effective. We had to deliver the education to the public, tell the public some of the things about the comparison between the program service and the radio service, and the advantages it had and the features we could supply; that there were no dark spots whatever upon the dial of the program service; that is, it was constantly on hand—that you could have it or not, for if you touched the button, you could turn it off.

We are always keen and alert at all times when anything of public interest goes on, such as the county fair, to have a booth at the fair and have something to give away to attract interest and attention, and to have our radio service out there to deliver the service. At industrial expositions and fall shows and Christmas festivals, we have booths, well-decorated, to advertise our program service and to play our service there.

We had a lot of local broadcasting. I only mentioned the broadcasting of the high-school entertainments and the church rallies or special features that came into the church. I mentioned that as the value that they had so far as program service is concerned, but I should not go over that point without telling you of the value they have to the telephone company.

Here are just a few letters that I picked up at random—we never filed them before because they came in such volume—complimentary letters where the pastor would write in to the telephone company and thank it on behalf of himself and his entire congregation for the splendid thing that the company had done in broadcasting a speaker. We have some letters from the Y. M. C. A., where the board of directors had passed a resolution complimenting the telephone company for broadcasting some of the events they had had down there.

I should have samples of newspapers during the last five years, but I have not, showing the free newspaper publicity that the telephone companies have gained by reason of the program service. One particular baseball game broadcast got publicity for the telephone company because printed on the first page of the newspaper signed by the editor, was this:

"Congratulations, Telephone Company! We certainly want to congratulate you upon your thoughtfulness in broadcasting this baseball game last night, which was of so much interest to the public of Lima, and we certainly hope you will continue."

That is something we could not possibly purchase through any advertising space we might have taken.

So far as methods are concerned in selling the service, the house-to-house canvass is really about the only one.

At Christmas time we do our very best to advertise. We send cards to prospects to suggest people give program service as Christmas gifts to their friends, because it is not a tremendously expensive gift, and it is a lasting gift by which they will be remembered as the donors all the year. It does not require much initial expenditure and they can pay for it at a monthly rate throughout the year.

We send out postal cards with a return card, saying if they will mail the cards our representatives will call. They are told that the service will begin the day before Christmas, and the name of the donor will be attached to the equipment.

Going from house to house sounds more or less simple, but we found it was not quite so easy. It takes a special man. I was in the washing machine business years ago, and I found very few people could go out and sell washing machines, while some could sell with ease. I think the same thing is true with telephone directory advertising. You have seen that some could not sell the advertising or get the price; others could.

We found that true again in house-to-house sales canvassing and for program service; about two out of ten could do it successfully. Some could sell two customers a week, while others on the side streets could sell 15. We found, however, that this was the real method for selling program service.

A WEEK'S SALES CONGRESS PROGRAM.

(*Concluded from page* 18.)

The third day's session was devoted to lessons on the nature of service sold, including information as to existing types of exchange and toll equipment, the necessity of standardization in order to secure results, definitions of the various types of service supplied, based on use; factors affecting rates and requests for rate information; the nature of and how to handle requests for residence and business service.

As a means of creating good relations with new customers, it was urged it be made certain that the customer understands just what sort of service he is to get; that it will be adequate for his needs and convenience, what it will cost him, and when and how he will pay for it. Salesmen should take a human, yet businesslike attitude and show a personal interest in and appreciation of the customer's need.

In handling contracts for new business service, special care is urged in securing the proper signature. As it constitutes a record of authorization for the service, including directory listing, it may be of value in fixing responsibility in cases of partnership or other concerns operating under trade names. Pointers were given also on signatures necessary under various forms of business organization.

The program of the fourth day was designed to makes salesmen familiar with the handling of directories and what went into them, and the need of taking pains with respect to accuracy; how additional listings and joint-user service are taken care of; what sales can be made of additional equipment in residences and business houses; how to handle service criticisms to the advantage of both customer and company; billing methods and excess mileage schedules. General discussion of the topics was invited in order that all doubtful points might be cleared up.

At the Friday meeting, Mr. McCulla explained the Christmas drive for 2,164 stations to round out the year's activities, went over the general sales plan that governs longer period activities, showing the possibilities present by offering, as does the company, so wide a variety of services in the communication field at modest prices.

Saturday was review day, and inspirational talks by General Manager Agee, C. W. Motter and others were part of the program. Mr. Motter touched on the aid that the salesmen can give in bettering public relations, and gave practical advice on advertising pamphlets and their use.

The lessons were carefully prepared by the commercial engineer's office, and formed a valuable course of study that will be utilized in future sales congresses. Kenneth L. Lawson and L. M. Campbell were contributors to the program on the final day.

Most of the newly appointed salesmen are men who have given promise in their activities in other departments, of ability to sell what the company has to offer; and they will aid the commercial department in merchandising the company's product.

One reason for this new form of activity is that while the normal demand for service has not slackened, the company has built facilities in excess of percentage of growth naturally expected from that source and these need to be sold.

Ultimate System for Program Service

What the Future Holds for Development of Program Service—Discussion of Radio Receivers, Amplifiers and Loudspeakers—Address Before Program Service Division of the United States Independent Telephone Association

By Frederic C. Young,

Development Engineer, Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

To study the future of program service, our only recourse is to consider the past and present and to project it into the future, so to speak. We may then with some degree of certainty be able to say what may happen in the future. Being principally involved in equipment development, I shall stay largely within my own province.

Early Equipment.

A number of years ago the telephone operating companies saw the possibilities of furnishing entertainment to subscribers by means of their existing telephone cables. At first such systems were home-made. The early experiments having proved the soundness of the idea, telephone manufacturing companies were interested.

There followed the development of battery-operated amplifiers for raising the power level of the outputs of radio receivers and phonographs. The equipment was mounted in panel units on a narrow steel frame supported by wall brackets.

The first use of pyramiding of amplifiers was incorporated in this system for raising the power level. Pyramiding means the driving by one device—radio, for example—of a number of amplifiers, each of which in turn drives other amplifiers.

Progress in the operating field was characterized by improved operating practices, the addition of microphone pick-up for local events, and the simplification of the systems. The telephone manufacturers carried on parallel study and development, which resulted in a number of improvements.

Alternating current operation succeeded battery operation. Large capacity amplifiers superseded the low capacity units. The frame was widened and made self-supporting. Radio receivers, phonographs and loudspeakers were improved.

Program service also found new application in hotels, apartment houses, schools, hospitals, etc., which further stimulated development.

In spite of these marked improvements, the engineer was aware of the necessity for further progress. At this point a concentrated study of a number of puzzling and "taken for granted" points was instituted.

The Radio Receiver.

The annoyance due to fading of radio signals was overcome by the automatic volume control which, acting instantaneously on the incoming signal, keeps it at a constant value on the detector tube. A curve shows that this is very nearly ideally accomplished from 100 to 100,000 microvolts in the antenna.

In the past, radio receivers were characterized by unequal sensitivity at the various radio frequencies encountered. The curve of a modern receiver shows about 7 or 8 per cent variation in sensitivity over the frequency range of 500 to 1,500 kilocycles. Heretofore, a few hundred per cent change was in order.

Selectivity also came in for its share of improvement, which resulted in uniformity and maximum selectivity consistent with good quality.

Screen grid tubes and linear power detection contributed their share to a truly remarkable development.

Amplifiers.

A study of amplifiers disclosed the advisability of improvement. As an initial step, frequency distortion was practically eliminated as shown by the gain frequency curve of a four-stage amplifier having an output of 20 watts. When the limits imposed by the other devices in the system are removed, the frequency range may be readily increased to satisfy additional requirements.

Cathode ray oscillograms and dynamic characteristics of vacuum tubes pointed the way to a minimization of non-linear distortion (the introduction of tones not in the impressed signal). For example, a certain power tube should be worked into somewhat more than twice its own impedance even in a push pull circuit.

To obtain the maximum undistorted output from the power tubes, it was necessary to find the maximum input impedance of the grid circuit looking toward the sending end. If this impedance is too high, non-linear distortion will result when the grid is swung (by the signal) to the vicinity of zero grid voltage.

Line Characteristics.

When supplying loudspeakers over cable pairs, a preponderance of high frequencies resulted. At 1,000 cycles per second, the power delivered to the speaker at the sending end of the line is 12 db. greater than at 100 cycles per second. Practically this is very noticeable.

To improve this recourse might have been had to individual equalizers. It was found, however, that the same effect could be obtained by properly matching impedances. This merely involved the transformer winding at the sending end and the speaker impedance at the receiving end and, consequently, involved no additional expense.

The rapidly-changing speaker load was thought to be serious. A family of curves indicates the result of a changing load of magnetic speakers. At 5,000 cycles per second, the power per speaker is the same, independent of the number of speakers connected. At 100 cycles per second, when the number of connected speakers varies from 1 to 400, the power per speaker varies less than 6 db.; from 200 to 400 speakers, about 3 db. and so on. For magnetic speakers, it is obvious that dummy loads are not essential.

Loudspeakers.

Advance in loudspeaker work is made possible by the development of loudspeaker response measuring equipment. Such measurements are made in highly-damped rooms. The energized loudspeaker excites a rotating microphone which produces a meter reading.

The loudspeaker-microphone link is replaced by an attenuator whose settings are adjusted to give the same reading as before the substitution. The relative response is obtained from the attenuator settings and plotted with reference to an arbitrarily assumed zero level. This is repeated at all the frequencies of interest.

Tracing the advance in the art so far, we see a concentration of effort on obtaining the facts regarding existing conditions. We see the thorough engineering of the project as compared to hit-and-miss methods. We see the attempt to obtain the ultimate from each existing piece of equipment.

In the future, we may expect a continuation of research and development by industrial concerns with facilities for such work and with the best interests of the art at heart. We may also expect advances in equipment and technique which may employ the bimanual effect, and appeal to the sense of sight as well as of hearing.

New Service Between England and South America.

Radio telephone service between Buenos Aires, Argentina and Rugby, England, was inaugurated on December 12. This is the fifth transoceanic service started by the International Telephone & Telegraph Corp. in the past 14 months.

The British Post Office is operating the English end of the new circuit. Previous telephone service between Latin America and Great Britain was by way of Buenos Aires and Madrid.

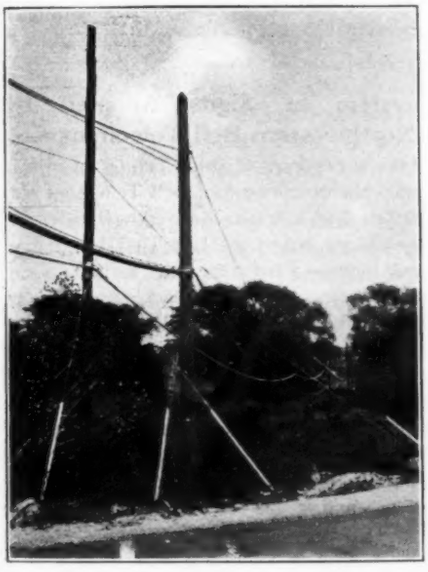
Here and There in Telephone Work

"I Wonder Why" of an Observing Traveling Telephone Engineer.

By Ray Blain.

I wonder why so many telephone companies continue to neglect the proper guying of corners, deadends and other poles in the line subjected to more than the usual strain?

A lead cannot be expected to stand and give service over an extended period unless the strain on such poles is properly taken care of by suitable guys and anchors. Patent anchors have been developed to such a point that guying is not near the work or expense that it was a few years ago, and there is small excuse nowadays for neglect of this all-important phase of telephone work.



Guying of End Poles Supporting Cable Across Small River.

The accompanying illustrations show a real job of guying. This is where an aerial cable crosses a small river with a single span supported on a double messenger; that is, the cable is fastened to the supporting messenger with the hangars in the usual manner, then a second messenger divides the strain with the one carrying the cable from an attachment in the center of the span.

There is no doubt that the strain on the end pole guys of a span of this type is exceedingly great, but it is hardly probable that the number of guys and anchors used are actually required. It is just that the engineers are making sure that they have an ample margin of safety by putting in an additional number so that any unusual strain to which the span might be subjected will be taken care of.

This is good engineering practice and should be carried out on all extra strain poles. If the pole needs a guy, put in one; and if there is any doubt that one might not hold, then put in two, for it is better to spend a little more for guys and anchors at the time the work is being performed than to be sorry later on.

Results of Personnel Work in Cases of Injured Employes.

Since February of this year J. S. L. Thomas has been successfully carrying on his own jewelry and watch repair business at Tenth and N streets, Lincoln, Neb. Back of this is a story of remarkable grit and determination on the part of a former worker for the Lincoln Telephone & Telegraph Co., and the winning out in a battle of unusual character.

Mr. Thomas was a combination man employed at the Friend exchange of the Lincoln company seven years ago, when he suffered a fractured hip from a fall. The doctors told him that it would take five years to get him back into a condition of self-support, but he tackled the future undismayed.

The next five years were a succession of stays in hospitals, operations, casts, treatment and slow waiting for nature to heal. He kept his face to the front and came through the first stages, only to find that he would never again be able to follow any of his former occupations, wire chief, testboard operator, lineman or combination man. At first he could walk only with the aid of two canes, but he was finally able to get about freely.

Conferences between telephone company officials, the state compensation commissioner and the vocational rehabilitation board followed, and he was set to work learning watch and jewelry repairing. The tools were supplied him by the board. After a year's apprenticeship in one of the leading jewelry stores in Lincoln, he went into business for himself, the telephone company aiding in getting his stock and equipment. He has won his way back to full independence and self-support.

Roy Hinsley, a Lincoln lineman, suffered a broken arm, shoulder and hip in a 25-foot fall from a pole. He came out of the hospital at the end of a year with a bad heart and so crippled that pole work was no longer possible.

A six months' training in automotive electrical work under employment conditions was arranged for him by the vocational rehabilitation board, compensation and part-time employment providing maintenance during training. He is now steadily employed as an expert automotive electrician.

Company Takes the Public Into Its Confidence.

The Jamestown Telephone Corp., Jamestown, N. Y., in a half-page newspaper advertisement entitled, "Notice to subscribers of the Jamestown Telephone Corp., on the Jamestown Exchange," tells of new tariffs that are to become effective January 1.

The Jamestown exchange was recently cut over to Strowger automatic equipment and it is stated that a slight readjustment of rural rates was necessary. In the center of the advertisement is a facsimile of a petition signed by Jamestown subscribers asking for dial service at the proposed rates. To the left of the advertisement are given the changes in rates for service and the rules.

In placing the reasons for the changes in rates before the public, the Jamestown company is following out its policy of taking its subscribers into its confidence. This is done in the advertisement as follows:

"On May 28, 1929, when this company first made public its plans for the adoption of the automatic service, we stated in the newspapers that the enormous cost of the reconstruction would make necessary a slight readjustment of rural rates.

When deciding to install the dial system, the directors said, 'We shall give our rural subscribers the same high-class service we propose to furnish subscribers in the city. We shall not ask them to be satisfied with the method, general elsewhere, of continuing manually operated telephones on party lines with all the bells on the lines ringing at the same time.'

To place the system in operation meant an enormous expenditure of money for the

new building, new equipment and the rebuilding of all rural lines—replacing iron with copper and replacing the old equipment with new dial instruments. We did this so that the people of Jamestown and vicinity might be served by the best telephone service obtainable. We did this because we believe in the future of Jamestown and Chautauqua County.

Our representatives are now interviewing the rural subscribers on the Jamestown exchange with petitions which are to be submitted to the public service commission. More than 90 per cent of the subscribers called upon have signed the petition and thereby have expressed their approval of the readjustment of rates to conform with the new service.

Our Jamestown subscribers have had the dial service for more than a month and have had an opportunity to recognize how perfectly the system operates. The improvement in the service has undoubtedly been a revelation to our Jamestown patrons as it has to our other subscribers. The change from the manual system has doubtless impressed all subscribers with the ease of dialing their calls and how quickly the called parties answer. They must also have recognized the greater clearness of hearing over the new system.

Party-line subscribers no longer have their bells ring day and night. Instead of this form of ringing, they know that whenever their telephone rings, the call is for them. And they can call subscribers at Frewsburg, Bemus Point and Lakewood without the aid of the operator and get the party almost instantly.

The Jamestown Telephone Corp. is a locally-owned and controlled institution. It is owned by 327 stockholders and a large number of bondholders. The directors, stockholders and officials are gratified at the reception the new system has been accorded by the public. There have been nothing but words of praise for it, and the company has been commended for its foresight in installing this splendid improvement.

The Jamestown Telephone Corp. prides itself on its excellent public relations—on its good standing with its patrons. This has been due largely, we think, to the attitude of the company in taking its subscribers into its confidence, discussing with them its plans in advance, thereby securing their cooperation.

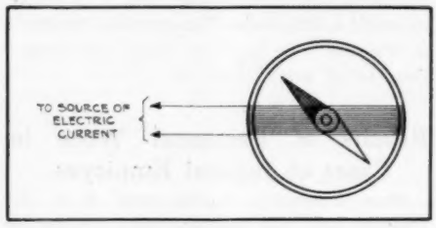
JAMESTOWN TELEPHONE CORPORATION."

P. B. X. Operating Current Supply; Meter Test.

By JOHN A. BRACKEN.

When the P. B. X. storage battery is properly cared for and in good condition, testing the specific gravity with a hydrometer is a very satisfactory method to determine its condition of charge. On the other hand, if the battery has not been given proper care, the specific gravity test is very misleading.

In some instances the specific gravity of a battery may test 1.250 to 1.300 as recommended by the manufacturers, indicating that it is in a fully-charged condition, whereas in reality it is only half-charged. This condition is possible when electrolyte is added to the cells to compensate (make up) for the loss of liquid due to evaporation. A battery in this condition is said to contain high acid.



Principle of the Galvanometer.

When the cells of a P. B. X. storage battery have high acid, the specific gravity test may indicate that the battery is fully charged; but when in service the switchboard equipment may not operate properly, or the switchboard lamps connected in a circuit may burn dimly. If this condition exists, it is necessary to have some means other than the hydrometer to determine the condition of charge. A first-class voltmeter is the most common as well as the most reliable instrument which may be used for the purpose.

A voltmeter is merely a galvanometer of high resistance connected across two electrical conductors of opposite polarity. The galvanometer is a current measurer and depends for its operation on the fact that a conductor, through which an electric current is flowing, will deflect a magnetic needle placed near it. This deflection is due to the magnetic field caused by the current.

Perhaps the simplest form of galvanometer is shown in accompanying diagram. An ordinary pocket compass has a few turns of fine insulated copper wire wound around its case. If current from a battery be sent through the coil of wire, the pivoted magnetic needle will tend to turn at an angle to the wire turns, providing the galvanometer has first been set so that both needle and turns are parallel.

As the resistance of a voltmeter is made extremely high in comparison with that of the conductors connected to it, only a minute current flows through it. Moreover, as this resistance is fixed, the only way to vary the amount of current flow is to vary the E. M. F. (electromotive force). An increased E. M. F. will increase the current flow, and likewise a decrease of one will produce a decrease of the other.

The terminals of a voltemeter are connected directly to the two points between which the E. M. F. is to be measured; that is, they may be applied to the positive and negative poles of an individual storage cell.

In measuring the voltage of a storage cell, attention must be paid to the internal resistance, temperature, etc., of the cell. Thus, if the voltmeter has a resistance of, say, 300 ohms, and is connected to a single cell of one-tenth ohm, only 1/3000 of the total resistance of the circuit is external to the voltmeter.

But as the E. M. F. in the circuit is distributed in proportion to the resistance to be overcome, nearly all of it will be spent on the voltmeter—(2999/3000) to be exact—and the reading will be practically correct. If the same instrument were used to test a cell having an internal resistance of 200 ohms, no less than two-fifths of the resistance would be in the cell. Only three-fifths of the E. M. F. would be spent on the voltmeter, the reading of which would, therefore, be entirely wrong.

A voltmeter having a scale calibrated up to three volts, each of these divisions being subdivided into at least 20ths of a volt, is best adapted for the purpose of testing individual storage cells.

System of Signs Adopted by Northwestern Bell Telephone Co.

As a result of a study lasting over two years the Northwestern Bell Telephone Co. has evolved a system of signs, all based on the old symbol of the Blue Bell, but in new and improved settings. Suggestions were asked from workers everywhere and pictures taken from all angles in the four areas of the company.

The idea back of the new system of signs is that when a stranger in a town wants to use long distance, he wants to find the telephone building in a hurry. The function of a sign is to direct him where to go; and it has the result also of effectively advertising the company locally. The new system of signs was agreed upon at a recent meeting of representatives from all areas.

As nearly as possible these will be uniform, although conditions and surroundings call for modification. The signs are variously classified, some identifying the location of the central office, some indicating public telephones and toll stations, and others pointing out with arrows the direction in which to go to find a service telephone. Identification signs will be of metal and arranged so that they may be mounted in a variety of places.

The standardized signs will be introduced only as the old ones wear out or are put out of use from other causes. The committees in charge found the task an unexpectedly difficult one, it being easy to agree on the essentials of what the sign should say and most of the design, but the trouble was to fit these into other signs properly and to comply with the varying regulations of the towns and cities served. Visibility is the chief end sought in the new designs because of the growth in number of motor tourists and their increasing use of long distance.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Wisconsin Supreme Court Declares Illegal Hotel Charge on Calls.

The Wisconsin Supreme Court on December 9 ruled that the Hotel Pfister, Inc., Milwaukee, could not legally charge its guests more than the customary five cents for each local telephone call from rooms.

Under the ruling the court sustained the action taken by Circuit Judge Walter Schinz, Milwaukee, who on April 25, 1930, dismissed the hotel company's request for an order restraining the Wisconsin Telephone Co. from cutting off the hotel telephone service.

The ruling of the Wisconsin Supreme Court also sustains a decision handed down December 3, 1910, by the railroad commission which declared that hotel service is merely an extension of the telephone company's service and no extra charge can be made.

The telephone company threatened to cut off the service because the hotel charged its guests 10 cents for each local call from a room, whereas a contract called for a charge of five cents.

The hotel management contended that its operation of a switchboard, and placing and receiving calls for guests was a secretarial service which warranted charging guests 10 cents per call.

Extra charges can be made for service calls between rooms in the hotel if the management desires, the court stated, but outgoing calls are only an extension of the telephone company's regular service into the hotel rooms, the same as to booths in the lobby, and are not subject to additional charges.

Southern Indiana T. & T. Injunction Hearings Postponed.

Hearings in the injunction suit of the Southern Indiana Telephone & Telegraph Co., Seymour, Ind., were postponed on December 10 for 30 days by Samuel Dowden, special master in chancery in the federal court in Indianapolis at the request of attorneys for the company who announced that L. C. Griffitts, president, had resigned, and that a reorganization of the company was under way.

Mr. Griffitts' name has figured in evidence before the master in chancery since the resumption of hearings this month. It was charged by attorneys for several of the southern Indiana cities affected by rate changes, that large and unreasonable expenditures on trips were made by the president and had been charged to costs of operations.

Attorneys for the company asked the continuance in order that new officials of the company might have time to become acquainted with the rate dispute. John F. Kent, of Chicago, vice-president of the company, is said to be in charge of the reorganization and is acting president.

New Rates Approved; Rural Switching Charge Cancelled.

It has been ordered by the Minnesota Railroad & Warehouse Commission that the Winona County Telephone Co. be permitted to establish and place in effect as of January 1, 1931, a new schedule of rates and charges applicable to the Altura, Lewiston and Rollingstone exchanges and to amend its present schedule by cancellation of the service station switching rate at the Lewiston exchange of $5 per year.

The Winona County company has its principal place of business at Lewiston, Minn. It was organized in September, 1928, for the purpose of merging the Mt. Vernon Farmers Telephone Co. and the Lewiston Telephone Exchange Co., operating dual exchanges in the village of Lewiston, Minn., and the Rollingstone Telephone Co., operating exchanges in the villages of Altura and Rollingstone, Minn., following public demand for unified service by the patrons and subscribers of these three telephone systems.

The net monthly rates now in effect at the exchanges are as follows:

	Lewiston	Rollingstone and Altura
Individual line business	$1.75	$2.25
Two-party line business	1.50	2.00
Four-party line business		1.75
Individual line residence	1.50	1.75
Two-party line residence		1.50
Four-party line residence	1.25	1.25
Rural multi-party ground or metallic circuit	1.25	1.50
Extension stations, business	.75	
Extension stations, residence	.50	.50
Extension bells		.25

Rural switching charge, $5.00 per year; 50 cents per month.

The gross monthly rates approved for the three exchanges are:

Individual line business	$3.00
Two-party line business	2.50
Individual line residence	2.00
Four-party line residence	1.75
Eight-party line residence	1.50
Rural multi-party residence (ground circuit)	1.75
Rural multi-party residence (metallic circuit)	2.00
Business extension stations (net)	.75
Residence extension stations (net)	.50
Extension bells (net)	.25
Hand sets, all classes of service (extra)	.25
Desk sets, rural multi-party residence (extra)	.25

The usual service connection and move charges were authorized. Also included in the new schedule are: One party-line business or residence outside exchange area, individual line rate plus 25 cents additional for each quarter-mile distance; temporary disconnections at one-half regular rate for any class of service; a discount of 25 cents per month to be allowed on all local gross rates at Lewiston exchange if paid on or before the 20th of the month in which service is rendered.

Local rates at Rollingstone and Altura exchanges together with rural rates at all exchanges are to be billed quarterly in advance with a discount of 75 cents if paid on or before the 20th of the first month of the quarter; 50 cents discount if paid on or before the 20th of the second month of the quarter, and 25 cents discount if paid on or before the 20th of the third month of the quarter.

Files Suit for Rate Reduction in Chattanooga, Tenn.

Fred M. Williams, attorney for George W. McCollum, president of the Citizens Service League of Chattanooga, Tenn., filed a petition in Chancery Court in that city on December 6 asking for a reduction in rates charged by the Southern Bell Telephone & Telegraph Co. Practically the same charges contained in the petition now pending before the Tennessee Railroad & Public Utilities Commission, are set forth in the bill.

Attorney Williams said that the delay or refusal of the utilities commission to set a date for the hearing occasioned the filing of the petition in chancery here.

Rural Company Increasing Rates; Service to Adjacent Town.

Recently, the Pequot Rural Telephone Co. was ordered by the Minnesota Railroad & Warehouse Commission to establish and place in effect as of January 1, 1931, the schedule of rates and charges as set forth in the applications.

The Pequot Rural company owns and operates a magneto exchange at Pequot, Minn., serving approximately 72 town and 129 rural stations, and performs a switching service for 32 connecting company stations. Telephone service in the village of Jenkins is also furnished by this company.

from its Pequot switchboard, such service being handled over multi-party lines directly connected for local exchange service.

The old and new monthly rates are as follows:

	Old Net	New Gross
Individual line business	$2.00	$3.25
Four-party line business, Jenkins	2.00	3.25
Individual line residence	1.50	2.00
Multi-party line residence	1.00	.
Four-party line residence		1.75
Four-party line residence, Jenkins	1.50	2.00
Rural multi-party business, metallic circuit	1.00	2.75
Rural multi-party business, ground circuit	1.00	2.50
Rural multi-party residence, metallic circuit	1.00	2.00
Rural multi-party residence, ground circuit	1.00	1.75
Extension stations, business	1.00	*1.00
Connecting company station	.25	*.50

* Net.

An extra monthly charge of 25 cents was authorized for handset telephones in town and for desk sets on rural lines. The usual discounts were also authorized, as well as service connection and move charges.

The present value of the company's plant including appreciation, depreciation, going concern value, materials and supplies, working cash, etc., is approximately $13,500.

The estimated annual gross earnings on the basis of the rates petitioned for will amount to $4,950. The estimated annual operating expenses based upon the company's experience for the year 1929, including a fair annual allowance for depreciation and taxes will amount to $4,005, leaving an estimated net return of $945. This net return is equivalent to 7 per cent of the estimated present value.

Nebraska Company Authorized to Issue $32,000, 5 Per Cent Bonds.

The Nebraska State Railway Commission has authorized the Blair Telephone Co., of which E. C. Hunt is president and majority stockholder, to issue $32,000 of 5 per cent bonds, to mature in 1945. In June, 1927, it was authorized to issue a similar amount of 6 per cent bonds maturing in 1942, the proceeds being used to purchase the property of the Northwestern Telephone Co. which operated a rival exchange at Blair. The United States Trust Co. is trustee.

The order recites that when the old issue is retired, the company may issue the new bonds. Mr. Hunt desires to take advantage of the favorable conditions of the bond market at present, and although he will receive but 94 net on the new issue as compared with 95 net on the old one, he figures that he will save $1,995 over the entire period of the life of the mortgage.

He is also to set aside $2,000 a year out of earnings as a sinking fund to retire the bond issue, and to report when the substitution is made. The commission commends it as a sound piece of financing.

New York Bell Authorized to Purchase Small Rural Company.

The New York Public Service Commission has consented to the sale of the telephone plant of W. Linn Mariotte to the New York Telephone Co. The plant is located in the towns of Amboy, Hastings and Parish, Oswego county, New York. The price to be paid for the property is $700.

The territory served by the Mariotte plant is a farming community, the largest village being Parish, where the New York Telephone Co. has an exchange. There are 59 subscribers and all of the instruments are wall sets. Mr. Mariotte has no exchange and the switching is done by the New York Telephone Co.

Most of the property, which includes only the telephone lines, poles, telephone instruments and accessories, is the same equipment used in the original construction of the plant. The property in the towns of Parish and Amboy was built in 1910 and that in the town of Hastings in 1915. Nothing has been done to improve the properties since they were built.

In a memorandum written by Commissioner Neal Brewster and approved by the commission, it was stated that "the transfer is in the public interest because the property is old, is not in good condition, the telephone instruments are not modern ones, and new money should be invested to improve the property which the owner is unable to supply."

Gives Permission to Reduce Service Connection Charges.

All Indiana telephone companies were given authority on December 5 by order of the Indiana Public Service Commission to materially reduce rates on service connection, move and similar charges.

In an order authorizing the Argos Telephone Co. to reduce such charges, the commission inserted a clause permitting all telephone companies to voluntarily reduce their rates, upon the filing of new schedules with the tariff department.

The commission anticipates making the reduction mandatory, rather than one of permission, and for that reason fixed a public hearing on December 17. It is pointed out that the present rates were established by federal authority and approved by the Indiana commission in 1918, and are virtually "wartime rates."

Summary of Commission Rulings and Schedule of Hearings.

ILLINOIS.

November 18: Order approved extending until May 27, 1931, period of suspension of the proposed rates for desk telephones, stated in rate schedule I. C. C. 1, original sheet 5 for Sheridan, West Brooklyn, Leland, Paw Paw, Somonauk, Earlville, Compton; and I. C. C. 1, original sheet 7 for Sandwich and Mendota of the Illinois Commercial Telephone Co.

November 18: Order approved extending until May 23, 1931, period of suspension of the proposed rates for telephone service in Mt. Vernon, stated in rate schedule I. C. C. 2 of the Illinois Bell Telephone Co.

November 18: Application filed by the Illinois Bell Telephone Co., supplement No. 1, page 1, to I. C. C. No. 3, applicable to its Galena exchange, effective November 25, 1930. No action taken by the commission.

November 18: Illinois Bell Telephone Co. filed rate schedule I. C. C. 1, revised sheet No. 7, applicable to Chicago Heights exchange, effective December 4, 1930. No action taken by the commission.

November 26: Order approving lease executed October 3, 1930, between the Illinois Bell Telephone Co. as lessor, and the American Telephone & Telegraph Co. as lessee, covering premises in the city of Springfield for a term of 5 years, beginning January 1, 1930, and ending December 31, 1934, and so on from year to year for five additional years, unless sooner terminated at an annual rental of $15,288.42.

December 16: Hearing in Springfield before Commissioner Collins on proposed advance in rates for service in Princeville, county of Peoria, stated in rate schedule I. C. C. No. 3 filed by the Illinois Central Telephone Co.

December 17: Hearing in Springfield before Commissioner Wilson on proposed changes in rates for service in Freeport, Stephenson county, stated in rate schedule I. C. C. No. 6 filed by the Stephenson County Telephone Co.

December 18: Hearing in Springfield before Commissioner Kuhn on application of the Illinois Telephone Co. for permission to purchase the entire property and assets of Robert E. L. Smith operating a telephone exchange and service in Fayette, Greene county, and vicinity; for authority to eliminate the exchange and consolidate it with the Greenfield exchange and for a certificate of convenience and necessity to the Illinois Telephone Co. to operate the property.

INDIANA.

December 5: Petition of the Wilkinson Switchboard & Telephone Co. for permission to charge a 10-cent toll on all calls coming from the Commonwealth Telephone Co. dismissed.

December 5: Argos Telephone Co., of Argos, authorized to reduce service connection and other charges.

December 6: Petition filed by the Indiana Bell Telephone Co. for permission to issue 30,000 shares of common stock to be sold to the American Telephone & Telegraph Co. for par $3,000,000.

At the same time the American company petitioned for permission to make the purchase.

The money is to refund betterment and extension expenditures already made, the Indiana Bell petition states. It means capital stock increase from $30,000,000 to $33,000,000, which already has been petitioned for and allowed.

December 17: Hearing in Indianapolis on the commission's proposal to order reduction in service connection charges of Indiana telephone companies. The commission proposes to reduce the maximum installation charge from $3.50 to $2. Sev-

(*Please turn to page* 40.)

The Strowger Telephone-Call Recorder

Development Completed on Exchange and Subscriber's Station Mechanisms for Automatically Recording Numbers of Telephones Attempting Calls While Called Party Is Absent—Device Applicable Only to Automatic Exchanges

When a telephone call is lost because there is nobody at the called station to answer the ring, the calling party is annoyed by the necessity of making another call, and the called party frequently loses an important message. Doctors, lawyers, real-estate and insurance men, and others who must frequently leave their offices unattended, suffer particularly from such incidents, and will welcome anything the telephone company may do to prevent the loss of these calls.

Because of the need for such service, and its possibilities as a source of additional revenue to the telephone company, a recorder which solves this problem has been developed. This device is applicable only to automatic exchanges. It permits any subscriber calling the absent party to record his own number at the called station. He merely dials the number (after ascertaining that the called party is out), and it is recorded on a paper tape. When the absent party returns to his office, he may immediately dial the recorded numbers and thus establish the desired connections.

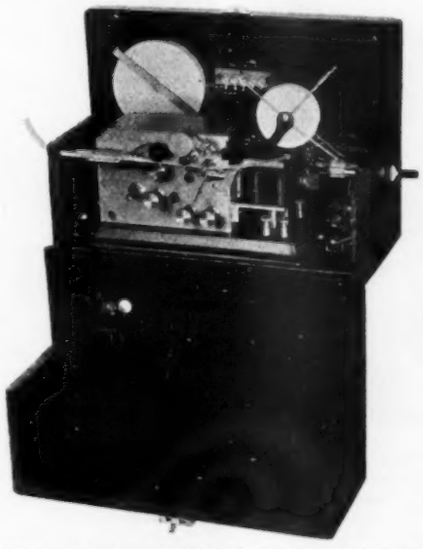
The Strowger telephone-call recorder consists of a specially-arranged pen-register and a switching key to cut the unit into and out of service. In use, it is merely inserted in the telephone line at the substation, terminals being provided for connection to the line, and to the telephone.

When the subscriber leaves his telephone, he throws the key, connecting the recorder to the line. Ringing current impressed on the line by an incoming call energizes the magnet of the pen-register, and starts its spring driven mechanism and paper feed. The mechanism immediately closes a direct-current path through the calling connector. Over this path, the ring-cut-off relay of the connector operates, and the back-bridge relay closes the current-supply circuit to the recorder.

The operation of the pen-register also produces a distinctive tone, which is impressed on the line. Upon hearing this tone, the calling subscriber knows that the called party is absent but has a call-recorder which is ready to record his telephone number. He then proceeds to dial his own number.

As the dialed impulses are received, the pen-register magnets operate in unison with them, and record the number of the calling telephone as a series of short dashes on the tape. If the call number includes letters, these are recorded as digits, but as the number may be recalled by these same digits there is no confusion. After the last digit is completed, the register feeds out about three inches of tape, which serves to separate the recorded number from that which follows.

On party lines using harmonic ringing, a traffic ringer is used in connection with the call-recorder. This ringer responds to the same frequency as the substation bell.



View of Strowger Telephone-Call Recorder with Cover Open.

and closes the circuit to the pen-register, which then operates as described above.

The Strowger telephone-call recorder is enclosed in an ebony-finished cabinet, made of laminated wood to prevent warping. The cabinet is 14¾ ins. long, 6¾ ins. wide, and 10½ ins. high, and is drilled and grooved for connecting wires for floor or wall mounting. The key lever, and the winding-key for the clockwork mechanism, project from the cabinet, and the marked tape feeds out through one end.

The only maintenance the recorder requires is occasional inking, and the replacement of the paper tape. These duties, and the winding of the spring can easily be taken care of by the subscriber.

For the operation of the call-recorder, the connector switch must be arranged to interrupt the battery feed through the back-bridge relay when the calling party dials his own telephone number. For this purpose, the busy relay is arranged as an auxiliary pulsing relay. On existing installations, the connectors can easily be changed to provide for this operation.

If it is desired to avoid changing all of the connectors, subscribers using the call-recorder service can all be placed in one group which is provided with the proper connectors. Of course, this would mean a change in their directory numbers. Subscribers objecting to this change could be permitted to keep their old numbers for ordinary calls. In the directory, such subscribers would have a double listing, the call-recorder number being used only when the call-recorder tone was received on the regular number.

The first installation of Strowger telephone-call recording equipment is scheduled to be placed in service for the North State Telephone Co. at High Point, N. C.

Ship-to-Shore Service on Round-the-World Cruise.

An experiment in ship-to-shore telephone service will be made on the Red Star liner Belgenland, which left Antwerp for New York December 2 on her annual cruise around the world. It was announced that regular ship-to-shore telephone service through the American Telephone & Telegraph Co.'s New Jersey radio telephone stations would link the liner with this country while she was in the North Atlantic, and on the rest of her voyage around the globe as long as effective talking is found possible. Similar telephone connections will be maintained with Europe through short wave radio telephone stations in England.

This service will be largely experimental to determine to what extent ship-to-shore telephone service is feasible when the ships involved are out of the direct line of communication with the shore stations. The A. T. & T. Co.'s ship-to-shore transmitting and receiving stations, at Deal and Forked River, N. J., respectively, are directional. Their antennae are designed so as to direct the greatest amount of electrical energy along the North Atlantic ship lanes, and to prevent loss of energy in other directions.

Ship-to-shore telephone equipment on the Belgenland is owned and operated by the International Marine Radio Co., a subsidiary of the I. T. & T. Corp., which manufactured the equipment. The globe-circling voyage will be the first during which the apparatus has been in service, although previous tests have proved its efficiency.

Radio engineers of the A. T. & T. Co. and Bell Telephone Laboratories are frank to admit that telephone contact with the ship will probably be lost at many stages of the cruise. Talking between the ship and United States telephones will probably be most successful while the Belgenland is in the North Atlantic.

If the British shore stations can hold conversations with the vessel while it is in the Mediterranean and other Eastern waters, direct connections may be made with United States telephones.

Kellogg Sets Go to Antarctic With Byrd

Byrd Antarctic Expedition Supplied With Test Sets and Telephones—Expression of Appreciation for Cooperation Signed by Byrd Which Was Sent to Kellogg Switchboard & Supply Co. Greatly Prized by Officials of Company

By R. C. Krueger,
Advertising Manager, Kellogg Switchboard & Supply Co.

In the president's office of the Kellogg Switchboard & Supply Co., Chicago, hangs a certificate of appreciation, set in a simple black ebony frame that reads:

"Rear Admiral Richard E. Byrd
U. S. N. (retired)
and the Executive Committee
of the Byrd Aviation Associates
express to
Kellogg Switchboard & Supply Co.
their enduring appreciation
of the most valuable cooperation in the
equipping of the
Byrd Antartic Expedition
It is our privilege to attest, and we most
gratefully acknowledge, that without
such assistance the accomplishment
of the expedition of the Ant-
artic would not have been
possible.
(Signed) R. E. Byrd, Leader.
James I. Bush, Chairman."

This is an acknowledgment and expression of congratulation to Kellogg for the part of its telephone equipment had in helping to make the Byrd Antarctic Expedition the success that it was. It is indeed a splendid tribute to Kellogg, paid by the great polar explorer.

For 20 long months Rear Admiral Richard Evelyn Byrd and his companions lived in the Antarctic barrens, thousands of miles from home—hundreds of miles from the nearest civilization. Isolated on a continent larger than our own, they were left without means of returning to the world they had left behind—or more explicitly, on top—until their transport ship, "City of New York," broke its way through the ice pack a year later.

Their base camp, "Little America," replete with several buildings, towering antenna masts, radio, telephone, three planes, and other equipment that had filled the holds of two vessels, was established on the edge of a vast ice barrier. Everywhere there was a wilderness of ice and snow with temperatures often down to 72 degrees below zero and usually not much higher. Still, despite the intense cold, the men were sunburned because of the blinding reflection and the fact that the sun was always on a level with their faces, just a few degrees above the horizon.

Seventy-mile blizzards were common, while any exploration work beyond the immediate vicinity of their camp was exceedingly dangerous. On such trips, every step they took had to be tested to avoid hidden cracks and chasms in the ice—into

Rear Admiral Richard E. Byrd, Well-Known Polar Explorer, Who with Companions Spent 20 Months in the Antarctic Region Gathering Scientific Data.

which a slip would probably mean death. For six months complete darkness hid their camp. During this long antarctic night, they had to make surveys by torchlight every 24 hours about their camp to ascertain that the ice on which their camp was built was not breaking up.

More than once after a heavy snow their camp was entirely hidden under a shroud of white with the exception of three guard-like radio towers. Passageways, constructed with the boxes of food and supplies, enabled the men to maintain connections with the several houses. A complete telephone system using Kellogg equipment gave them a means of intercommunication between houses and camps.

At one time two of the men were out in a plane for the purpose of making a geological survey further inland. A raging blizzard blew up in the unbelievably short time characteristic of Antarctic meteorological disturbances. Although they landed and anchored their plane, the force of the wind and snow tore it to bits, leaving them stranded hundreds of miles from "Little America." It was 14 days before they were found and brought back. The history-making fly over the South Pole, where a failure or an error of any kind meant the end, was a fitting climax to the gargantuan task that Byrd had outlined for his men and himself.

These few words of description can portray but a small portion of the hardships and perils that the men and equipment were faced with. That they braved these dangers willingly, that they shipped with Byrd fully knowing from past experiences what they would be confronted with in the vast, merciless reaches at the bottom of the world, is indeed a tribute to the courage and loyalty of every man of them. That Commander Byrd could accomplish the wonders that he did and return without the loss of a single man is truly remarkable.

The entire trip was planned and re-

Scene in Antarctic Region Showing a Sledge Party Mushing Its Way Across a Small Crack in the Ice on Way to Establish an Emergency Camp for the Airplane Flight of Rear Admiral Byrd and His Companions to the South Pole.

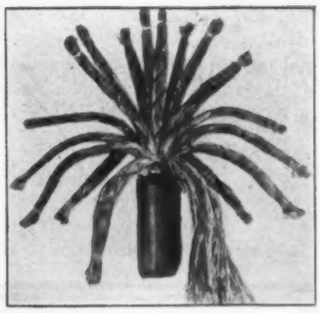
In fair weather or foul . . .

Western Electric backs up your telephone service

In foul weather, just as in fair, Western Electric backs up the Bell System with all the apparatus and supplies needed to restore, maintain or expand your telephone service.

This Company manufactures telephone equipment of every sort, with a skill acquired through 50 years' experience. At 32 warehouses it holds great reserves of telephone material available for shipment day or night. It delivers and installs the apparatus when and where needed.

The large scale manufacture of standardized equipment, too, is an economy. So is the concentrated purchasing—a responsibility that Western Electric undertakes for the telephone companies of the Bell System. All in all, here is a work of mass production, purchasing and distribution which for size and complexity has no parallel in industry.



1818 conversations at one time can be carried on through this new type cable. It contains 3636 insulated wires within a diameter of 2⅝ ins.

The flying telephone laboratory in which Western Electric airplane telephone equipment has been developed by the Bell Laboratories. Provision for communication between ground and plane marks a great forward step in flying.

One of the 18 materials in your telephone is rubber from the plantations of Sumatra. Western Electric goes to market in every corner of the world.

Western Electric

Makers of Bell Telephones

planned months ahead. Every conceivable problem was considered, every possible emergency was planned for, and a means of meeting it was arranged beforehand. Two or three times as much food as actually required was taken, valuable equipment was duplicated and triplicated, and in every instance an ample margin of safety was allowed.

The equipment ultimately chosen was selected only after exhaustive tests had proved it to be fully capable of standing up and doing the job it was supposed to do, under the conditions which would be met at the pole. The choice of equipment that would be equal to the task was exceedingly important. Any failure was more than a serious matter—it might well be fatal.

Despite the grueling use and adverse conditions to which they were subjected, Kellogg test sets and telephones "came through in high." Despite wear and tear that no telephone would experience in several ordinary "lives," Kellogg did not fail to render good service. Temperatures varied from 100 degrees above zero en route through the tropics, to 72 degrees below zero in the paralyzing winds at the pole: a total difference of 172 degrees, yet the telephone apparatus did its work and did it well.

When telephones were talked into out in the open, the moisture from the user's breath coated the mouthpiece with ice. When the telephones were brought inside the warm buildings, moisture condensed on their cold surfaces so quickly that they dripped water.

It is a matter of some pride to the Kellogg organization that Admiral Byrd and his organization selected Kellogg equipment, and that their choice was merited as the results and the certificate received have shown. The certificate is treasured as yet another evidence of Kellogg's workmanship, soundness of engineering principles, and high standard of quality entering into every item.

The Kellogg equipment that went to the South Pole and back came from the same stock as equipment used in every-day line work and in thousands of private residences. Nothing was added or changed. But because every piece of Kellogg equipment is made to meet high standards, it stood the test and did its work well—that is why the brochure attesting to its fine performance hangs in the president's office today. It is treasured in that it signifies that Kellogg in some way helped to make successful one of the most marvelous and valuable expeditions ever undertaken in the name of science.

Rear-Admiral Richard E. Byrd
U.S.N. (Retired)
and the Executive Committee
of the Byrd Aviation Associates
express to
Kellogg Switchboard & Supply Co.
their enduring appreciation
of the most valuable co-operation in the
equipping of the
Byrd Antarctic Expedition
It is our privilege to attest, and we most gratefully
acknowledge, that without such assistance the
accomplishment of the Expedition in
the Antarctic would not have been possible.
LEADER
CHAIRMAN
{MCMXXVIII-MCMXXX}

A Framed Certificate of Appreciation Was Sent to the Kellogg Switchboard & Supply Co. for Its Cooperation in Equipping the Adventurous Expedition to the South Pole.

Talks with Governors of 44 States in One Day.

Probably the most important and certainly the most extensive conference ever conducted entirely by telephone in the United States was held recently when Col. Arthur Woods, chairman of President Hoover's emergency committee on the employment situation, talked by telephone from his office in Washington in one day with the governors or accredited representatives of each of the 48 states.

The day's telephoning employed some 100,000 miles of wire. The calls ranged in distance from the connection with Annapolis, only 30 miles from Washington, to the one with Sacramento, Calif., 3,363 miles away. Col. Woods in the single day spent four hours and nine minutes in actual telephone conversation.

Col. Woods actually talked with 44 governors. In the other four states in which the governors were unable to keep the telephone appointment, he talked with the lieutenant governor, secretary of labor, or other authorized representative of the state.

A special operator was assigned by the telephone company to make the appointments with the governors, so that the calls might be made in scheduled sequence. A period of ten minutes was allotted for the call to each state executive. When the prearranged time for each state arrived, Col. Woods was signaled that the governor was "on the wire." The special operator had devoted an entire previous day to making the telephone appointments with the governors and perfecting the schedule.

The man-to-man talks with the state executives enabled the federal committee to know definitely what each state was doing, and the governors were further informed of the national government's program and urged to speed their plans to full coordination in the states.

"Telephony's" Engineering Data.

By B. C. Burden.

Index, Cable Plant Construction.
December 20, 1930
No. 3-B, Page 7.

A simple method which can be used on dead cables, consists in the helper grounding both wires of a pair to be identified, and the splicer locates the pair by means of grounded buzzer and battery. When the pair is located, each side is tested for continuity and the helper advises the splicer of the pair number.

For communication between splicer and helper a good operator's receiver is generally used both for transmitter and receiver. However, a somewhat more convenient method is to use an operator's headset (transmitter and receiver) in series with battery.

Miscellaneous Notes on Cable Splicing.

In making splices on existing cables where the cable is not cut so as to permit the use of a regular lead sleeve, it will be necessary to use a split sleeve. A split sleeve is made by cutting a regular sleeve lengthwise with a hack-saw to permit spreading it sufficiently to place over the cable. The edges of the cut are beveled with the shave hook, and the seam is soldered shut after the sleeve is in place, using a soldering iron and a good solder.

There is considerable hazard in connection with cable splicing unless certain precautions are observed. Care should be exercised in handling molten solder and hot paraffin as many serious injuries have occurred through carelessness.

In underground work the furnace and the solder and paraffin should be kept at a sufficient distance from the manhole so as not to endanger the splicer in the event of something overturning. In passing heated solder or paraffin

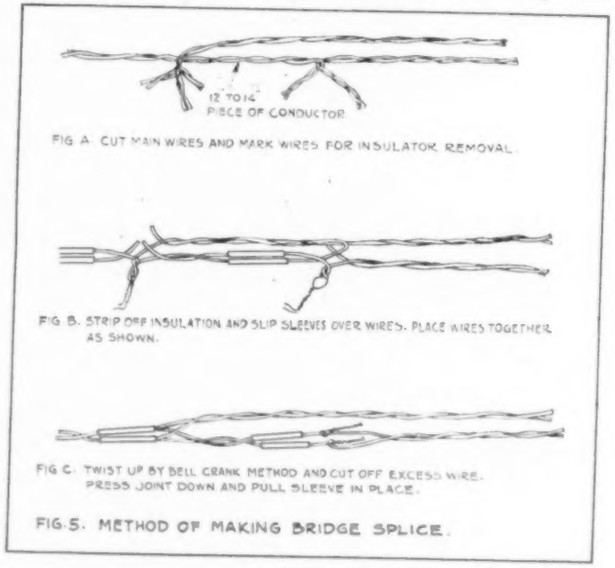


FIG A. CUT MAIN WIRES AND MARK WIRES FOR INSULATOR REMOVAL.

FIG B. STRIP OFF INSULATION AND SLIP SLEEVES OVER WIRES. PLACE WIRES TOGETHER AS SHOWN.

FIG C. TWIST UP BY BELL CRANK METHOD AND CUT OFF EXCESS WIRE. PRESS JOINT DOWN AND PULL SLEEVE IN PLACE.

FIG. 5. METHOD OF MAKING BRIDGE SPLICE.

"Telephony's" Engineering Data.
By B. C. Burden.

Index, Cable Plant Construction.
December 20, 1930
No. 3-B, Page 8.

up to a splicer on a platform, the helper operating the handline should not stand under or near the platform.

Cotton sleeving should be boiled in paraffin and then cut to the proper lengths. The helper can punch up sleeves during idle time and store them in a cigar box.

Fibre test boards which are arranged to handle 51 cable pairs can be obtained from telephone supply houses and are to be preferred to the home-made variety. Test boards can be obtained with the following numbering: 1-51, 51-101, 102-152, 152-202, 203-253, 253-303, 304-354, 354-404, 405-455, 455-505, 506-556, 556-606, 607-657, 657-707, 708-758, 758-808, 809-859, 859-909, 910-960, 960-1010, 1011-1061, 1061-1111, 1112-1162, 1162-1212.

Wiping cloths can also be obtained from supply houses so that it is no longer necessary for a splicer to go to the trouble of making his own cloths.

Every splicer has his own opinion on the percentage of tin and lead that his wiping solder should contain; most of the old-timers prefer to "mix their own." However, a better wiped joint is assured by standardizing on some fixed percentage solder and adhering to it. Wiping solder in the proportions of 38 parts tin to 62 parts lead is very satisfactory and usually can be obtained in one and 1½-lb. bars.

For soldering seams on split sleeves and similar work, bar or wire solder composed of 50 parts tin and 50 parts lead should be used.

Cable terminals should be ordered equipped with 6½ or 10-foot stubs, for this work can generally be done cheaper in the factory or shop than out on a pole. On terminals at the end of a cable run it is, of course, feasible to extend the cable directly into the terminal without using a stub cable. Most present-day terminals permit the paper cable being run directly into the terminal without an insulated "pot-head" as was formerly the practice. The fanning chamber in the terminal is usually filled with an insulating and moisture-proofing compound after the wires are in place.

In cable-splicing work it is frequently necessary to make what is known as a "half-tap." A half-tap is in reality a temporary bridge splice.

An example of a case of half-tapping would be an office move in which a new office is being constructed at a different location than the existing one and it is desired to make an "instantaneous cutover." By bridging all of the pairs working in the old office onto the new office main frame by means of "half-taps," it would thus be possible to run jumpers and terminate the subscribers on the new board.

The cut-off relays (on common battery boards) would be blocked open by small fibre insulators in the new office until the time of cut-over. These insulators would then be removed, throwing the new board into service while at the old office the heat coils would be pulled to cut the old board out of service. The so-called half-taps would then be made up in permanent form, cutting off or rearranging the cables extending to the old office.

"Telephony's" Engineering Data
By B. C. Burden.

Index, Cable Plant Design.
December 20, 1930
No. 6-A, Page 1.

Cross-Connecting Boxes.

General.

Cross-connecting terminals permit the connecting together of cable pairs in different cable by means of jumpers. These terminals consist essentially of two sets of binding posts. Each set terminates in a stub cable, the two stub cables being spliced to the two cables which the box serves to "cross-connect." See Fig. 1.

Types of Cross-Connecting Boxes.

Cross-connecting terminals are used in sizes from 25 to 400 pairs. They usually consist of vertical strips of binding posts, one set of the posts being connected to its stub

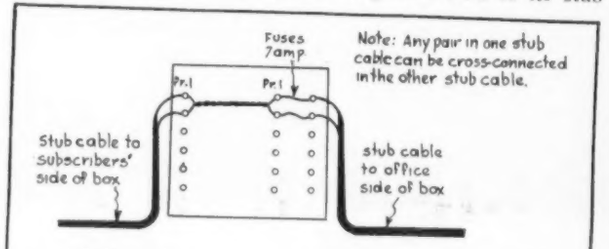

Fuses 7 amp.
Note: Any pair in one stub cable can be cross-connected in the other stub cable.
Pr. 1
Pr. 1
Stub cable to subscribers' side of box
stub cable to office side of box

Fig. 1 ONE-PAIR SCHEMATIC OF CROSS-CONNECTING BOX.

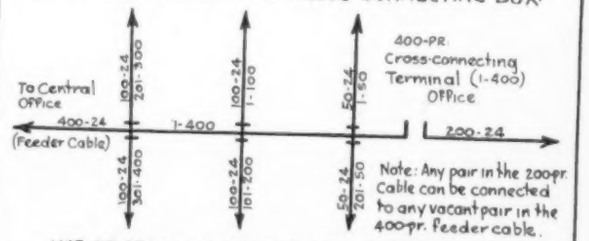


Fig. 2 USE OF CROSS-CONNECTING BOX TO RELIEVE CONGESTION

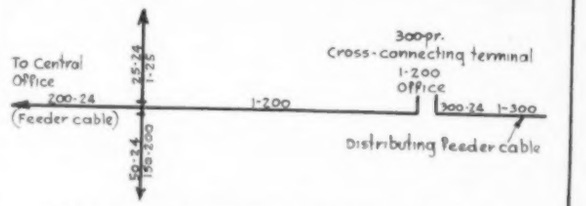


Fig. 3 USE OF CROSS-CONNECTING BOX TO TERMINATE A LARGER NUMBER OF PAIRS IN BRANCH THAN IN MAIN CABLES.

(Over)

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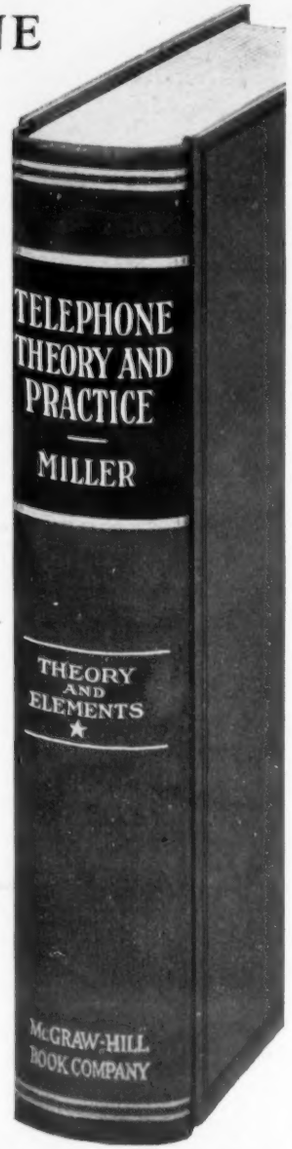

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cable through 7-ampere fuses. The housing is generally a wooden box arranged for pole or building mounting.

Cross-connections are made by regular jumper wire.

Purpose of Cross-Connecting Terminals.

Cross-connecting terminals have two general purposes:

1. To fuse the junction of aerial and underground cables.

2. To permit working cables at a greater fill than would ordinarily be possible without the connecting box between feeder and branch cables.

It was formerly the practice of the large companies operating in metropolitan areas to fuse the junction of aerial and underground cables with the idea of preventing lightning or power crosses from damaging the underground pairs and from running into the office and creating a fire hazard. There were also certain reasons, such as the reduction of electrolytic damage, which indicated their use to be advantageous.

Their use, however, has been confined in recent years to relieving cable congestion only, as it is contended by some of the companies that no fuse protection is required between aerial and underground as the No. 24 gauge cable (which is usually present) will fuse before the fuses in the cross-connecting terminals could operate.

The best present practice is, therefore, to place cross-connecting terminals only where they are required to relieve cable congestion.

Cross-connecting terminals are especially advantageous in exchanges where the growth is slow and where existing cable congestion can be relieved to a large extent by the judicious use of the proper size cross-connecting terminal.

It should be understood that cross-connecting terminals do not reduce the fill or number of working pairs in a cable, but only re-distribute the vacant pairs, thus permitting a greater fill than would otherwise be possible.

There are two conditions under which these boxes may advantageously be used in connection with cable congestion, viz.:

1. For use in relieving congestion on heavily-multipled cable branches. This is accomplished by cutting the box in between the multipled branches and the main feeder cable, thus permitting any pair on the branch to be connected to any vacant pair on the feeder cable side of the box.

2. For purposes of connecting a given number of branch cable pairs to a smaller number of feeder pairs. This kind of a circumstance is found in areas which have to be rebuilt because of cable or pole conditions and where it is desired to place ultimate size cables in these locations which may contain a larger number of pairs than the feeder cables.

Their use complicates record work to some extent, as a record of both the office side and the subscriber side of these boxes, must be kept.

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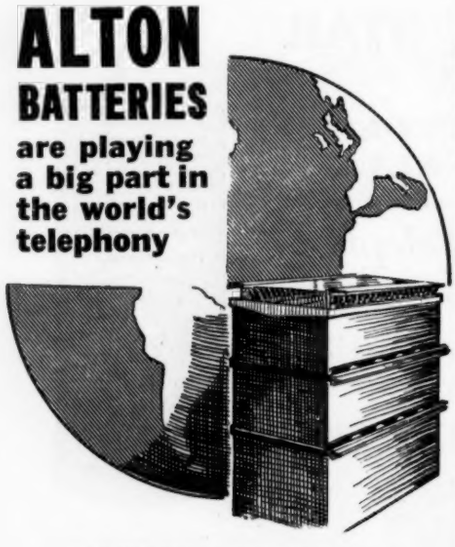

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WHAT THE COURTS AND COMMISSIONS ARE DOING.

(*Continued from page 32.*)

eral telephone companies have made voluntary reductions in installation charges.

MINNESOTA.

January 12: Hearing in St. Paul on petition of the Western Buse Telephone Co., the Swan Lake Telephone Co., line 11 and 13, Fergus Falls Rural Telephone Co., Excelsior Rural Telephone Co., French Rural Telephone Co., Hoot Lake Telephone Co., Horseshoe Lake Telephone Co. and Red River Rural Telephone Co.

The hearing was postponed from December 9 to this date.

KANSAS.

December 15: Hearing in Topeka on application of the DeSoto-Olathe Tele-Co. for permission to sell its plant and property in Johnson county.

December 15: Hearing in Topeka on application of the Inland Telephone Co. for a certificate of convenience and authority to transact the business of a public utility in Johnson county.

December 15: Hearing in Topeka on application of the Inland Telephone Co. for a certificate relating to a proposed issue of its preferred stock and common stock.

December 15: Hearing in Topeka on application of G. F. Gant and Amelia Gant for permission to sell their telephone plant and property at Durham, Marion county.

December 15: Hearing in Topeka on application of the Central Kansas Telephone Co. for a certificate of convenience and authority to transact the business of a public utility at Durham, Marion county.

December 15: Hearing in Topeka on application of the Wellsville Telephone Co. for permission to sell its plant and property at Wellsville.

December 15: Hearing in Topeka on application of the Inland Telephone Co. for a certificate of convenience and authority to transact the business of a public utility at Wellsville.

December 15: Hearing in Topeka on application by the Chamber of Commerce of the city of Goodland and the United Telephone Co. for an order authorizing the United company to build and install a modern automatic dial system and discontinue the magneto service at its exchange in Goodland, and fixing new rates to be charged for such service.

December 15: Hearing in Topeka on application of the Junction City Telephone Co. of Junction City for a certificate relating to a proposed issue of its preferred stock in the amount of $60,000.

December 27: Hearing in Cimarron on application of the Western Telephone Corp. for permission to make certain changes in rates for service at Cimarron.

MISSOURI.

November 5: Applications filed by the United Telephone Co. for authority to make certain changes in rates for service at Windsor; to furnish service to subscribers at Clifton City for Otterville exchange and abandon Clifton City exchange; to increase certain rates for its Tipton exchange.

November 12: Application filed by the Andrew County Mutual Telephone Co. for permission to close the exchange at Rea and furnish service from the Whitesville exchange.

November 19: Application of the United Telephone Co. to increase certain of its rates for service at Harwood, filed.

November 19: Application of the Southwestern Bell Telephone Co. for an order to issue common stock filed.

November 28: Application of the Middle States Utilities Co. of Mo. for permission to abandon its exchange at Edinburg denied.

December 3: Joint application filed by the Ozark Central Telephone Co. to sell and the Southwestern Bell Telephone Co. to purchase certain telephone property.

December 11: Hearing in Tipton on application of the Stover Telephone Exchange for authority to file a new schedule of rates and rules and regulations for telephone service.

December 12: Application of the Inter-County Telephone Co. to file exchange tariff for service at Altamont, Galltain, Pattonsburg, Coffey, Jameson, Amity, Clarksdale, Fairport, Maysville, Osborn, Santa Rosa, Stewartsville and Weatherby, approved.

December 15: Hearing in Bethel on complaint of the commission upon its own motion against the Bethel Telephone Co. for failure to provide satisfactory service to its subscribers at Bethel and vicinity. An order was issued by the commission December 6 calling for investigation of the service.

NEBRASKA.

December 8: Application filed by Northern Telephone Co., of Creighton, for authority to publish a joint-user's rate of $1.25 per month net; granted as requested.

December 9: Application filed by the Continental Telephone Co. for authority to publish a rate for optional ten-party rural automatic selective service outside the initial area at its Columbus exchange. It appearing that this service was not covered in a recent order fixing rates at this exchange and the request being reasonable, it is directed that the company be authorized to publish for wall type of instruments a business net rate of $3.25 a month and a residence rate of $2.25 net.

December 10: Application filed by the Citizens Telephone Co., of Malmo, for authority to publish a rate of $2 a month for metallic farm line service on farm lines Nos. 5 and 10 on its Morse Bluffs exchange.

NEW YORK.

December 11: Purchase of the telephone property of W. Linn Mariotte by the New York Telephone Co. approved. The property is located in Amboy, Hastings and Parish, Oswego county.

December 17: Hearing in Albany on petition of the Pioneer Telephone Co., of Clarence, Erie county, for authority to transfer its telephone works and system to the New York Telephone Co. which joins in this petition. The New York Telephone Co. also petitioned for modification of the commission's order of November 18.

NORTH DAKOTA.

October 31: Petition of citizens of Beulah for improved telephone service granted.

November 7: Authority granted the Oliver-Mercer Telephone Co. to dismantle its telephone line in township 144, range 85, Mercer county.

November 7: The first revised local exchange tariff of the Northwestern Bell Telephone Co., providing for a change in the base rate area at Mandan, approved.

November 7: Approval granted application of the Montana-Dakota Power Co. for approval of route and specifications for a private telephone line from Williston to the village of Cartwright and from the village of Cartwright to the Montana state line.

November 7: Application of the Rocky Ridge Telephone Co. of Scranton, for authority to dismantle 1¾ miles of telephone line in Bowman county, granted.

November 7: Approval granted appli-

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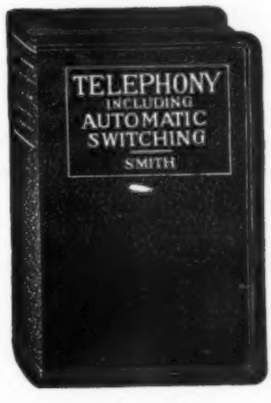

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cation of the Montana-Dakota Power Co. for approval of route and specifications for a private telephone line from the Montana state line the vicinity of Carlyle, Montana, to Dickinson, N. D.

November 7: Approval given the revised local exchange tariff filed by the Northwestern Bell Telephone Co., applicable at Beach, Golva and Sentinel Butte, providing for metallic rural service.

December 8: Approval granted the application of the First Farmers Telephone Association of Lansford, to dismantle 2½ miles of telephone line.

December 8: The first revised local exchange tariff applicable at New Salem, filed by the Northwestern Bell Telephone Co., approved.

OHIO.

December 5: Ohio Bell Telephone Co. filed a petition for authority to extend the city service area of Youngstown and revise the rate schedule. The company said the revision would mean a savings of $9,500 a year to subscribers.

December 10: Increased rates approved for Alexandria and Johnstown served by the Ohio Central Telephone Co. The increased rates in Alexandria have been collected under bond since October 16, 1928, and in Johnstown, since December 16, 1928.

The commission's order followed a conference by public utilities commissioners with attorneys for the telephone company at which the conclusion was reached that the increased rate schedules were not unreasonable.

A bond, which was posted by the company in connection with filing of the rates in Alexandria, will be withdrawn as a result of cancellation of the suspension order.

December 10: Commission allowed the application of the Convoy Telephone Co., of Convoy, for increased rates collected under bond since February 16, 1929.

OKLAHOMA.

December 8: Hearing on application of the Southwestern Bell Telephone Co. for increase in exchange rates at Chickasha. The hearing was postponed from December 1.

December 12: Hearing on complaint of Troy A. Simpkins of Tulsa, vs. the Southwestern Bell Telephone Co., alleging the Bell company invaded territory of complainant.

PENNSYLVANIA.

December 1: Hearing in Harrisburg on the application of the Pennsylvania Telephone Co., formerly the Mutual Telephone Co., of Erie, for approval of a plan to purchase four telephone companies in Pennsylvania for more than $4,000,000.

The companies are: Chemung Telephone Co., of Bradford county; Johnstown Telephone Co., Somerset and Cambria counties; Petroleum Telephone Co., Venango and Crawford counties, and the Western Telephone Co., of Somerset counties.

December 2: The Sullivan & Muncy Creek Telephone Co. filed a complaint against the West Branch Bell Telephone Co., contending that the latter had invaded its territory by paralleling its lines with the complainant's at Picture Rocks and other places.

WISCONSIN.

December 18: Continued hearing in Hudson on application of the Wisconsin Telephone Co. for authority to abolish the free line between Hudson, New Richmond, Hammond and Baldwin and to apply standard toll rates to all calls between these points.

Hudson and the other affected communities are making an effort to induce the commission not to grant the application.

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